

Ancient Climate

刘东生, 安芷生, 陈明杨, 1996,
最近0.6Ma南、北半球古气候对比初
探, 中国科学, 26(2): 97-110

本文将我国黄土高原最近0.6Ma夏季
风加强以及35~25Ka

BP和4~2.5Ka BP时段东亚夏季风增
强的记录与澳洲干旱或沙漠化增强
记录进行了对比, 提出导致澳洲沙
漠化的高压增强, 通过穿越赤道
的气流可能在过去增强东亚季风的
论点; 另外,

本文还提出了另一论点: 全新世气候
适宜期东亚与澳洲气候记录所表明
的同步变化, 可能反映了与蒙古高
压系统有关的东亚冬季风环流穿越
赤道对澳洲夏季风环流增强的影响
, 南、北半球季风气候通过穿越赤
道的气流相互作用可能自0.6 Ma
BP开始表现明显。

关键词: 0.6Ma BP气候转型
澳洲高压与东亚季风
蒙古高压与澳洲夏季风

Liu Dongsheng, An Zhisheng, and Chen
Mingyang. 1996. A correlation between Southern
and Northern Hemispheres during the last 0.6 Ma.
Science in China (Series D) 26(2):97-110.

A comparison of climate records between the
Chinese Loess Plateau, which shows a
strengthening of the summer monsoon in the last
0.6 Ma and a strengthening of the Asian summer
monsoon during 35 to 25 and 4 to 2.5 ka BP
intervals, and the Australian records, which show
a strengthening of aridity or desertification, is
analyzed. The results suggest that the Australian
high pressure leading to desertification
strengthened the Asian summer monsoon in the
past through the cross-equator circulation. On the
other hand, the synchronous variation in the
Holocene Optimum, as indicated by Asian and
Australian climate records, suggests that the cross-
equator East Asian winter monsoon circulation
related to the Mongolian high pressure might have
influenced the Australian summer monsoon. The
interaction of the monsoon climate between the
Southern and Northern Hemispheres through
cross-equator circulation probably started to be
obvious since 0.6 Ma BP.

Keywords: change of climate type at 0.6 Ma BP,
Australian high and East Asian monsoon,
Mongolian high and Australian summer monsoon



王富葆, 韩辉友,
阎革等, 1996, 青藏高原东北部30
Ka以来的古植被与古气候演变序列,
中国科学, 26(2): 111-117

本文利用孢粉分析并结合沉积学及¹⁴
C测年等资料, 阐明了青藏高原东北
部若尔盖高原30Ka来的古植物与古
气候演变系列及主要的气候事件。
结果表明古植被经历了高寒荒漠、
草原、草甸等七个阶段; 气候与植
被相应发生了多次变化, 冰后期和

Wang Fubao, Han Huiyou, Yan Ge, et al. 1996.
Paleovegetation and paleoclimatic evolution series
on Northeastern Qinghai-Xizang Plateau in the
last 30 ka. Science in China (Series D)
26(2):111-117.

Palynological study of two lacustrine suites by
limnological and ¹⁴C dating reveals the local
evolutionary history of the paleovegetation and
the paleoclimate of the Zoige Plateau,
northeastern Qinghai-Xizang Plateau in the last
30 ka. The evolution of territorial paleovegetation
experienced seven stages, such as alpine desert
vegetation, grassland, meadow, etc., and the
inferred paleoclimate evolution shared similar
corresponding variations. The major climatic

全新世期间的气候事件在这里均有明显表现。这说明青藏高原对全球气候变化具有“启动区”和“放大器”的作用；不同时期不同气流变化是产生本地区气候变化的主要动力。

关键词：若尔盖高原 古植被
古气候

吕厚远, 吴乃琴, 刘东生, 1996, 150Ka来宝鸡黄土植物硅酸体组合季节性气候变化,
中国科学, 26 (2): 131-136

本文深入细微地研究了黄土沉积中地质记录可以在多大空间、时间尺度上显示古季风的演化历史。通过对现代表层土壤中植物硅酸体组合变化趋势与深海氧同位素变化的比较, 研究了宝鸡黄土剖面约150Ka来植被类型的演替及1月、7月、年降水和温度变化。可见, 在黄土高原地区“轨道尺度”上大的气候变化确实受到全球变化的控制, 也揭示了季风气候在不同时期对该区影响强度的差别。

关键词：黄土 植被硅酸体
古季风

李训述, 程国栋, 郭东信, 1996, 气候持续变暖条件下青藏高原多年冻土变化趋势数值模拟,
中国科学, 26 (4): 324-327

应用数值方法模拟了气候持续以0.04°C/a速度变暖条件下, 我国青藏高原多年来冻土热状况可能发生的

events during the periods of post-glacial and the Holocene left their distinct marks in the sediment record.

Keywords: Zoige Plateau, paleovegetation, paleoclimate



Lu Houyuan, Wu Naiqin, and Liu Dongsheng. 1996. Seasonal climatic variation recorded by phytolith assemblages from the Baoji Loess sequence in Central China over the last 150,000 years. Science in China (Series D) 26(2):131-136.

This paper presents the results of phytolith assemblages from 153 modern surface soil samples of China and from the upper of 12-m loess layer of the Baoji loess-paleosol sequence to analyze the phytolith types and to investigate seasonal climatic variation. The results show the variations in temperature and precipitation and evolution of vegetation pattern for the past 150,000 years in the Baoji loess section. The impact of changing monsoon intensity in different periods in this area is discussed.

Keywords: loess, phytolith, paleomonsoon



Li Shuxun, Cheng Guodong, and Guo Dongxin. 1996. The future thermal regime of the permafrost of the Qinghai-Xizang (Tibet) Plateau, China, under a climate warming from numerical simulation. Science in China 26(4):324-327.

Numerical simulation indicates that the future thermal regime of permafrost on Qinghai-Xizang Plateau will change as the air temperature (T) continuously rises at 0.04°C/year. The calculated results show that when Ts are 0, -0.5, -1.5, -2.5,

变化趋势。计算结果表明,在计算所假设条件下,当初始地面年平均温度为0.0, -1.5, -2.5, -3.5和-4.5°C时, 14m深度上的年平均地温分别为-0.11, -0.59, -1.52, -2.45, -3.21和-4.32°C, 多年冻土厚度为16.8, 29.0, 54.1, 79.7, 112.1和 131.0m时, 经50a的环境持续升温后, 14m深度上的年平均地温分别升高为0.0, 0.0, -0.36, -1.23, -2.16和-3.07°C; 初始年平均地温高于-1.1°C时, 多年冻土由衔接型变为不衔接型; 低于-1.1°C时, 多年冻土上限分别由初始的1.8, 1.6, 1.4和1.2m增大为2.2, 2.0, 1.8, 1.6m, 且多年冻土厚度不发生大的变化。所以, 如果未来气候以文中的速度或低于该速度变暖, 50a内我国青藏高原多年冻土分布将不会发生大的变化。

关键词: 青藏高原多年冻土
气候变暖 年平均地温 数值模拟

-3.5, and -4.5°C under equilibrium between climate and permafrost thermal regime, the permafrost thicknesses respectively equal to 16.8, 29.0, 54.1, 79.4, 112.1, and 131.0 m and the mean annual temperatures at the depth of 14m correspondingly equal to -0.11, -0.59, -1.52, -2.45, -3.21, and -4.32°C. After 50 years, the temperatures at the depth of 14m will rise to 0.0, 0.0, -0.36, -1.23, -2.16, -3.06°C under the given condition. If the temperature is higher than -1.1°C, the frozen ground will change from the attachment type of frozen ground into the detachment type of frozen ground. When the temperature is lower than -1.1°C, for example, the permafrost will respectively change from 2.0, 1.8, 1.6, and 1.4 m to 2.2, 2.0, 1.8, and 1.6 m, for Ts of -1.5, -2.5, -3.5, and -4.5. Therefore, if the future air temperature rises at 0.04°C/year or lower, the decreased area of the permafrost on Qinghai-Xizang Plateau may not be over 30%. The areas include those changing from the attachment of frozen ground into the detachment of frozen ground. If the area of detachment of frozen ground is not included, the decrease in area will only be 3% within 50 years.

Keywords: permafrost on Qinghai-Xizang Plateau, climate warming, annual mean ground temperature, numerical simulation



姚檀栋, 秦大河, 1996, 青藏高原2Ka温度与降水变化——古里雅冰芯记录, 中国科学, 26(4): 348-353

古里雅冰芯中的 $\delta^{18}\text{O}$ 和冰川积累量高分辨地连续地记录了青藏高原过去2Ka的温度和降水变化。在这一段时间内, 曾出现了8次暖期和7次冷期。其中4次重要寒冷事件有三次出现在小冰期, 1次出现在11-12世纪。降水的波动相对较小, 这段

Yao Tandong and Qin Dahe. 1996. Variations in temperature and precipitation in the last 2000 years on the Xizang (Tibet) Plateau—Guliya Ice Core record. Science in China (Series D) 26(4):348-353.

Past temperature and precipitation variations are recorded precisely and continuously in $\delta^{18}\text{O}$ and glacial accumulation records in the Guliya ice core. Eight warm periods and seven cold periods can be distinguished in the past 2000 years. Of the four most intensive cold periods, three are in the Little Ice Age and one in the 11th to 12th century. The variation of precipitation is relatively small compared with that of temperature. Five humid periods and four dry periods occurred in the

时间内出现过5次相对高降水期和4次相对低降水期。古里雅冰芯所记录的温度和降水的长期变化趋势呈正相关, 但降水变化滞后于温度变化。

关键词: 古里雅冰芯 $\delta^{18}\text{O}$
冰川积累量

past 2000 years. The long-term variation of temperature is positively correlated with that of precipitation according to the Guliya ice core record, but the variation of precipitation lags behind the variation of temperature.

Keywords: Guliya ice core, $\delta^{18}\text{O}$, glacial accumulation



王苏民, 羊向东, 马燕, 1996,
江苏固城湖15Ka来的环境变迁与古
季风关系探讨, 中国科学,
26(2): 137-141

固城湖的环境变化记录为探讨季风活动提供了依据。湖围垦区的钻孔表明自15 Ka BP

开始, 固城湖的环境有一明显的变化。固城湖的形成、扩张和收缩与季风环流的变化及其引起的季风降雨关系密切。后者明显受轨道驱动的控制, 其中11.3~11.0KaBP突变的降温, 可能与新仙女木事件相当。事件在一定程度上截断了轨道驱动的气候旋回, 在季风区表现为极锋在短期内发生大范围向南迁移。通过与相邻南北区域的对比, 季风极峰位置存在两次北推和两次南移的过程。

关键词: 高分辨 环境演化
季风降水 固城湖

Wang Sumin, Yang Xiangdong, and Ma Yan.
1996. Environmental change of Gucheng Lake of Jiangsu in the last 15 ka and its relation to palaeomonsoon. Science in China (Series D) 26(2):137-141.

The high-resolution and multi-proxy analysis of lacustrine sediments from the Gucheng Lake has revealed the palaeoclimate and palaeoenvironmental evolutionary process since 15 ka BP. The formation, expansion, and shrinkage of the lake are closely related to monsoon rain caused by strength change of monsoon circulation which is controlled by orbital forcing. An abrupt decrease of temperature occurring from 11.3 to 11.0 ka BP can be correlated to a Younger Dryas event that truncated the monsoon climate cycle. It is known through correlation with adjacent regions that there were two northern shifts and two southern migrations of the polar front of monsoon rain.

Keywords: high resolution, environmental evolution, monsoon rain, Gucheng Lake

郭正堂, N. Fedoroff, 刘东生, 1996, 130Ka来黄土——古土壤序列的典型微形态特征与古气候事件, 中国科学, 26 (5): 392-398

对中国西峰、洛川、渭南晚第四纪黄土及古土壤的微形态研究表明, 不少形态特征与植被和土壤湿度状况有良好的指示意义。宜作为环境变幅研究和气候事件对比的标准。130Ka来的黄土至少记录了16个气候事件。其中部分为轨道事件。另一部分时代只与非轨道原因的Heinrich事件有关。后一类事件期间黄土高原植被稀疏, 风力强盛, 局部有较弱的冻融作用。而事件之间的高原中东部有可观的草原植被。

关键词: 黄土 古土壤 微形态
古气候

Guo Zhengtang, N. Fedoroff, and Liu Dongsheng. 1996. Micromorphology of the loess-paleosol sequence of the last 130 ka in China and paleoclimatic events. Science in China (Series D) 26(5):392-398.

The Late Quaternary loess-soil in Xifeng, Luochuan, and Weinan are studied in order to investigate the micromorphology of both loess and paleosols. Many features have clear climatic implications and may be used as indications of morpho-stratigraphic and climatic correlation. The temporal and spatial variations of these features allow us to define 16 climatic events for the last 130 ka, which are highly consistent with the variations in paleo-weathering intensity. Part of these events are attributable to orbital forcing whereas others are more or less synchronous with the Heinrich events recorded in the North Atlantic Ocean. During the latter events, the Loess Plateau was characterized by sparse vegetation cover and strong winds whereas the climatic conditions between these events were considerably humid, resulting in a significant steppe cover.

Keywords: loess, paleosol, micromorphology, paleoclimate



韩家懋, 姜文英, 刘东升, 1996, 黄土碳酸盐中古气候变化的同位素记录, 中国科学, 26 (5): 399-404

本文对采自西峰、洛川和渭南黄土剖面的钙结核和全岩样品中碳酸盐的碳氧同位素组分进行分析, 发现黄土钙结核的碳氧同位素可以成为有效的古气候变化的指标, 记录了它们形成时期的环境状况, 对不同地点的同位素数据对比有可能提供过去环境变化的空间格局。全岩样品的碳酸盐的同位素组分也记录了有用的环境信息, 过去150Ka渭南剖面的碳氧同位素曲线很好地反映不

Han Jiamao, Jiang Wenying, and Liu Dongsheng. 1996. Paleoclimate changes in Chinese loess. Science in China (Series D) 26(5):399-404.

Oxygen and carbon isotopes of carbonate in concretion and bulk samples collected from the Xifeng, Luochuan, and Weinan loess sections, China, have been analyzed. The carbon and oxygen isotopic ratios of concretion in paleosol, as useful paleoclimatic indicators, recorded temperature and humidity variation during their formation. Comparison of isotopic data from different locations can offer a spatial picture of past environmental changes. Isotopic data from the carbonate of a bulk sample also include useful environmental information. Carbonate isotopic records of carbon and oxygen isotopic curves of last 150 ka in Weinan reflect the fluctuations of the paleoclimate with different stratigraphical units. The curves correlate well with those of

同地层单位代表的古气候波动, 这些曲线可以和黄土中其他的气候指标及深海沉积物的同位素记录相对比。

关键词: 碳氧同位素 次生碳酸盐
黄土-古土壤 古气候 古环境变化

other climatic proxies and of the deep-sea sediments.

Keywords: carbon and oxygen isotopes, secondary carbonate, loess-paleosol sequence, paleoclimate, paleoenvironmental change



孙东怀, 安芷生, 吴锡浩, 1996,
最近150ka黄土高原夏季风气候格局
的演化, 中国科学,
26(5): 417-422

Sun Donghuai, An Zhisheng, and Wu Xihao.
1996. Evolution of the summer monsoon regime
over the Loess Plateau of the last 150 ka. Science
in China (Series D) 26(5):417-422.

通过覆盖黄土高原的30个黄土古土壤
剖面磁化率的测量, 绘制了倒数第二
冰期(约150KaBP), 末次间冰期(

约130-
74KaBP), 末次冰期间冰段(约59-
24KaBP), 末次间冰期极盛期(约
18KaBP), 及全新世气候适宜期(约
9 KaBP) 5个特征气候期的磁化率
等值线路图。以末次冰期极盛期黄土
的磁化率作为风成粉的原始磁化率,
相对于这个本底值的磁化率增量可作
为夏季风气候活动在相应地区的指示
及其相对强度。据此, 初步恢复了磁
化率等值线所反映的各个时期夏季风
气候的空间格局, 并估计了夏季风平
均锋面的活动范围及其北界的可能位
置。从而粗略地再现了最近150Ka黄
土高原夏季风气候格局的演化过程。

关键词: 黄土 古季风 磁化率
古气候重建

From magnetic susceptibility data for 30 sections
covering the Loess Plateau, contour maps of
susceptibility are given for five time intervals: the
last second glaciation (150 ka BP), the last
interglaciation (130-74 ka BP), the interglacial of
last glaciation (59-24 ka BP), the last glacial
maximum (18 ka BP), and the Holocene Optimum
(9 ka BP). The susceptibility value of the last
glaciation maximum loess is regarded as the base
value of pedogenic loess or paleosol. The
susceptibility increment to the base indicates
summer monsoon activity and its strength. On this
assumption and susceptibility contour maps, the
variation sequence of the summer regime is
reconstructed for the last 150 ka. The extent and
the northern boundaries of the summer monsoon
front activity are also estimated for each stage. It
suggests that the evolution history of the summer
monsoon regimes revealed by the susceptibility
contour maps not only provides information on
the position, strength, and configuration of the
climate members influencing the summer
monsoon, but also provides some climatic signals
from the polar and Southern Hemisphere.

Keywords: loess, paleomonsoon, magnetic
susceptibility, paleoclimate reconstruction.

石宁, 1996, 上新世—早更新世云杉属和冷杉属在华北地区的发展及其气候指示意义, 第四纪研究, (4): 319-328

本文研究了上新世—更新世云杉属和冷杉属在华北地区的发展, 并讨论了其气候指示意义。结论显示: (1) 华北地区的云杉属和冷杉属自

4.4Ma BP

的上新世早期即开始大量发展, 当时它们的生态习性与现代寒温带种类不同; (2) 云杉属和冷杉属不适宜作为第四纪开始的标志; (3) 云杉属, 冷杉属和喜暖植物在上新世—更新世的演化和迁移导致它们今日相隔遥远的分布, 这一过程反映了华北地区气候变化和季风气候发育的历程。东亚季风可能是晚上新世逐渐加强, 而在2.3Ma BP

前后已形成了第四纪时期的基本特征。

关键词: 上新世 云杉属 生态习性 冰期 东亚季风气候

Shi Ning. 1996. Development of spruce and fir in North China during the Pliocene and the early Pleistocene: Paleoclimatic implications. Quaternary Sciences (4):319-328.

Development of spruce and fir in North China during the Pliocene and the early Pleistocene is studied, and its paleoclimatic implications are discussed. The following conclusions can be made from the study: (1) *Picea* and *Abies* developed in North China from early Pliocene (4.4 Ma BP), and the Pliocene *Picea* and *Abies* have different ecological demands than most modern species. (2) The development of modern distribution patterns of *Picea* and *Abies* that are distantly separated from the thermophilous plant reflect formation of the monsoon climate in northern China. The monsoon climate was gradually strengthened in the late Pliocene and its Quaternary pattern may be formed around 2.3 Ma BP.

Keywords: Pliocene, *Picea*, habitat, glaciation, east Asian monsoon climate



葛知缙, 李保华, Uwe

Pflaumann, 1996, 西太平洋晚全新世变冷事件, 中国科学, 26 (5): 416-466

对取自冲绳槽和南海的3个重力柱状样(255, 170, 17940-2柱状样)进行浮游有孔虫分析后发现: 所有属种中, *Pulleniatina obliquiloculata*显示出对西太平洋晚第四纪冬季表层海水温度反应灵敏, 其相对丰度的变化显著, 且在各柱状样间可以对比, 全新世最显著的变化是约4-2KaBP前的

Jian Zhimin, Li Baohua, and Uwe Pflaumann. 1996. Late Holocene cooling event in the western Pacific. Science in China (Series D) 26(5):416-466.

Cores 255, 170, and 17940-2, raised from the Okinawa Trough and the South China Sea, have been studied for planktonic foraminifers. Among all the series, *Pulleniatina obliquiloculata* is shown to be sensitive to winter sea surface temperature in the late Quaternary in the western Pacific. The fluctuations in its relative abundance are significant and correlatable between the cores. The most conspicuous change during the Holocene is the *Pulleniatina obliquiloculata* minimum zone around 4-2 ka BP, which correlates to neoglacial cooling. The widespread occurrence of this cooling event in the western Pacific

P. Obliquiloculata 最小值带,
可能与新冰期变冷有关。这一变冷事件在西太平洋的广泛存在表示 *P. obliquiloculata*

可以作为古海洋和气候变化的示踪器, 对于海-陆气候对比亦较重要。

关键词: 变冷 晚全新世

Pulleniatina obliquiloculata

西太平洋

suggests that *Pulleniatina obliquiloculata* is promising as a paleoceanographic and climatic monitor, possibly important for reconstructing sea-land correlation of climate.

Keywords: cooling, late Holocene, *Pulleniatina obliquiloculata*, the western Pacific



李志中, 1996,
塔里木盆地北部全新世地层中的孢粉组合与古环境,
干旱区资源与环境, 10(1): 22-29

本文通过对塔里木盆地北部全新世地层中27块样品的孢粉分析, 探讨了该地区全新世的古环境特征。全新世以来, 除了塔里木河中游隐域性植被成分随着河道改道变化频繁外,

塔里木盆地北部地区河道两侧显域性的旱生、超旱生荒漠植被成分无明显变化,

它们的生境反映了气候环境总的形势是持续干旱的。但全新世地层中孢粉种属和丰度的变化, 蒿属、藜科和麻黄花粉相对数量的增减也说明了在干旱背景中本区气候有微弱的干湿波动, 这表现为全新世早期和晚期气候偏凉湿, 中期气候干暖, 但干暖期鼎盛阶段略湿。

关键词: 塔里木盆地北部 全新世孢粉组合 气候环境

Li Zhizhong. 1996. Pollen component in the Holocene stratum and paleoenvironment in the northern part of the Tarim Basin. *Journal of Arid Land Resources and Environment* 10(1):22-29.

Through pollen analysis of 27 samples collected from the Holocene stratum in the northern part of the Tarim Basin, the paleoenvironment in this region is analyzed. Because there were only obtuse changes in the composition of the dry and ultra-dry ecological desert vegetation zones in this region, except that of regional vegetation of the Tarim River Basin, it is suggested that the Holocene climate in this region was dry as a whole. But there were also small changes in the quantity of pollen family and abundance and in the quality of *Artemisia*, *Chenopodiaceae*, and *Ephedra* pollens etc. in the stratum, which indicates that there were small wet and dry fluctuations under the background of a dry climate. That is, the paleoclimate in this region was relatively cold and moist in the early and late stage, warm and dry in the middle stage, and during the Holocene Epoch, the period was a little wet at the Megathermal Maximum.

Keywords: northern part of the Tarim Basin, Holocene Epoch, pollen component, climate environment

赵英时, 杨忆, 1996,
全新世海侵痕迹遥感信息特征提取方法研究, 地理研究 15(1):73-81

应用TM、MSS、NOAA等多平台、多波段、多时相遥感信息,并结合地貌、水文地质、岩相、历史考古学等地学信息进行综合分析,研究了华北平原全新世海浸痕迹信息特征的提取方法。研究中特别注重利用与海侵有着直接成因关系的地下咸水体及水化学特征变化所传递的信息。这些信息涉及到水、热、盐、土、植被等环境因子。通过多种图象处理方法,突出古海岸线两侧环境因子的综合差异,识别和勾绘古岸线。
关键词: 全新世海侵 遥感图象处理 专题特征提取

Zhao Yingshi and Yang Yi. 1996. A study of methods of extracting remote sensing information features from Holocene transgression traces. Geographical Research 15(1):73-81.

An integrated analysis of multispectral and multitemporal remote sensing image data (TM, MSS, NOAA/ AVHRR) and geoscience data (geomorphological, hydrogeological, lithofacies, archaeological) was carried out to identify paleo-coastal lines since the Holocene Epoch in the eastern part of the North-China plain. The emphasis of the study is on the utilization of information on the spatial distribution of salt groundwater and changes in the water's chemical components, which are closely related to paleo-sea transgression and reflect some information on environmental factors, such as water, heat, salt, soil, and vegetation. Some image-processing methods are used to better reflect the combined landscape features of soil salinization (vegetation, land use, geomorphy). Furthermore, integrated processing of images concentrating thematic information has effectively enhanced the difference of landscapes for two sides of the transgression boundary in the Holocene Epoch. Finally, supported by the geographic information system (GIS), a variety of thematic maps are digitized. On the basis of spatial registration, an integrated data set is generated and used for defining and verifying the paleo-coastal lines.

Keywords: Holocene transgression, remote sensing image processing, extraction of thematic features



张伟强, 黄镇国, 1996,
台湾晚更新世以来的环境考古, 热带地理, 16(4):291-298

从地形地貌、地层、孢粉、化石、古文化遗存等方面出发,结合构造运动及海平面变化,讨论了台湾晚更新世以来的环境变迁,并与邻区对比。台湾晚更新世的古

Zhang Weiqiang and Huang Zhenguo. 1996. Environmental archaeology of Taiwan since the late Pleistocene. Tropical Geography 16(4):291-298.

Through the study of landforms, strata, spore-pollen, fossils, ancient culture sites, tectonism, sea-level change, etc., the environmental change of Taiwan since the late Pleistocene is analyzed. In the late Pleistocene or before, the environment of Taiwan was mainly affected by tectonism and sea-level change during glacial stages, but mostly in the Holocene climate and sea-level changes affected the environment. The environment of

环境演变与台湾最重要的构造运动—蓬莱运动之后余动及冰期、间冰期气候与海平面升降密切相关。进入全新世,构造运动对台湾环境的演变已不扮演主要角色,而气候因素及海平面变化则起重要作用。全新世早期,台湾岛的环境与晚更新世晚期相同,但气温已有所回升。中晚全新世,台湾是一个波动的热带环境。

关键词: 台湾 环境考古 晚更新世

Taiwan in the early Holocene was similar to that in the late glacial stage but much warmer. Taiwan was a tropical environment in the middle and late Holocene with some fluctuation.

Keywords: Taiwan, environmental archaeology, Late Pleistocene



张伟强, 黄镇国, 1996,
台湾沿岸全新世海平面波动,
热带地理, 16(3): 226-235

Zhang Weiqiang and Huang Zhengguo. 1996.
Holocene sea level changes along the coast of
Taiwan. *Tropical Geography* 16(3):226-235.

根据海相沉积物样品的¹⁴C年代、高程数据,并以华南海平面变化曲线为参照系,分析了台湾沿岸全新世海平面变化。结果显示: 1) 在5000aBP以前,海平面曾快速上升,约5190aBP,出现全新世最高海平面,超出现今海平面3.2m; 2) 5000aBP之后,海平面呈振荡性变化,出现4次高海面,且高度逐次减小; 3) 通过对比台湾,福建及广东东部沿海的海平面变化,台湾海峡两岸全新世可能存在8次海侵或海平面流动变化。

关键词: 台湾 海平面 全新世

The change of the sea level of Taiwan in the Holocene was investigated, using data of altitude and ¹⁴C dating for 99 samples from marine deposits, and data along the coast of south China as reference. The results indicate that (1) the sea level rose quickly before 5000 a BP, the highest stand of sea level occurred in 5190 a BP, with an altitude of about +3.2 m. (2) The sea level has been fluctuating around its present position since 5000 a BP. Four higher sea levels occurred in 4120 ± 120 a BP, 3250 ± 40 a BP, 1970 ± 40 a BP, and 1300 ± 120 a BP, respectively, and the altitude of sea level decreased gradually. (3) From the calibrated data from the coast of Fujian and eastern Guangdong, it is concluded that there were eight cycles of sea-level changes of transgression during the Holocene along the coasts of the Taiwan Strait.

Keywords: Taiwan, Holocene, sea level

吴敬禄, 王苏民, 1996,
青藏高原东部RM孔碳酸盐氧同位素揭示的末次间冰期气候特征, 科学通报, 41(17): 1601-1604.

青藏高原东部若尔盖盆地RM孔碳酸盐氧同位素的研究表明, 当时青藏高原东部的气候存在相当于深海氧同位素5a, 5b, 5c, 5d和5e亚阶段的波动特征, 5e内部又有两次明显的冷波动, 可再细分为5e1, 5e2, 5e3, 5e4和5e5段, 其中5e5气候最暖, 5e3相对较弱, 5e2降温幅度最大。这一现象与最近GRIP冰芯及欧洲湖泊记录的研究结果较为吻合, 不同于深海及GISP2记录。
关键词: 末次间冰期 气候不稳定性 Eemian期 若尔盖盆地

Wu Jinglu and Wang Suming. 1996. Climatic variation during the last interglacial period recorded in the lake carbonate deposit, Eastern Qinghai-Xizang Plateau. Chinese Science Bulletin 41(17):1601-1604.

The oxygen isotope record from core RM in the Zoige Basin of the Qinghai-Xizang Plateau during the last interglacial period (the Eemian period) documents five climate fluctuations that are equivalent to substages 5a-5e. Moreover, there were five climate oscillations in the substage 5e record in the $\delta^{18}\text{O}$ of carbonate in the RM core, namely, 5e1 to 5e5, among which substage 5e5 was the warmest climate period. Substage 5e1 was an optimum episode of combined moisture and heat; 5e3 was a relatively weak warmer period, and 5e2 was colder. The results coincide with records from ice core of the Greenland Ice-core Project (GRIP) and European lake sediments. 5e1 was an optimum episode of moisture and heat, but in the whole interglacial period, 5a is an optimum substage. Moreover, the record of core RM also indicates that the cooling events lasted much longer than the warming one. This is similar to the GRIP record but different from the deep-sea and GISP2 record.

Keywords: the last interglacial period, climatic instability, the Eemian period, Zoige Basin



陈骏, 仇钢, 1996,
最近130Ka黄土高原夏季风变迁的Pb和Sr地球化学证据。科学通报, 41(21): 1963-1966.

从地球化学角度出发, 在黄土-古土壤剖面中寻找分辨率高、指示性强、成因清楚的气候代用指标。在分析了大量元素之后, 选择了Pb和Sr进行深入探讨。结果是, 黄土-古土壤序列中Pb/Sr比分布与夏季风场强变化有内在联系, 可望成为重建黄土高原夏季风变迁的又一替代性指标, 同时,

Chen Jun and Qiu Gang. 1996. Variation of summer monsoon intensity on the Loess Plateau of Central China during the last 130000 years. Chinese Science Bulletin 41(21):1963-1966.

The results of Rb/Sr ratio and magnetic susceptibility obtained from the Luochuan loess-paleosol section are presented and the relationships between variation of Rb/Sr ratio and fluctuation of climate are discussed. The research found that Rb/Sr ratio in the loess-paleosol sequence is linked to and controlled by the intensity of the summer monsoon. Therefore, the Rb/Sr ratio can be used to reconstruct the variations of summer monsoon intensity in Central China during the late Quaternary. Moreover, the coincidence of Rb/Sr distribution with magnetic susceptibility distribution in the sequence might

黄土—古土壤剖面中pb/Sr比分布曲线和磁化率分布曲线的同步变化,反映了这两个参数之间某种成因联系。

关键词: 古季风 黄土 古土壤
Pb和Sr地球化学

reflect some genetic relationship of the two parameters.

Keywords: paleomonsoon, loess, paleosol, Rb and Sr geochemistry



汪品先, 卞云华, 李保华, 1996, 西太平洋边缘的“新仙女木”事件, 中国科学, 26(5): 452-460

根据日本海、东海、南海等海区15个沉积柱状样, 对“新仙女木”期气候突变事件(YD)的分布和性质进行了探讨。在所有这些经高分辨率地层分析的柱状样中, 均发现有“新仙女木”事件, 说明西太平洋边缘海广泛出现。从同位素与微体古生物分析的结果看, $\delta^{14}\text{C}$ 测年约11-10

KaBP的新仙女木期, 是在12KaBP淡水注入海洋高峰之后, 一次冬季表层降水降温的短暂事件。在长江口和日本海都记录了新仙女木期“视海退”现象, 符合新仙女木期是两次海面快速回升期之间一次滞缓期的解释。新仙女木期的冬季表层水降温和盐度增加, 均表明冬季风而不是夏季风加强, 边缘海的这一次重大气候事件应对相邻陆地有深刻影响。

关键词: 新仙女木期 西太平洋边缘海 冰消期 古海洋学

Wang Pinxian, Bian Yunhua, and Li Baohua. 1996. The Younger Dryas in the West Pacific marginal seas. Science in China (Series D) 26(5):452-460.

The occurrence and nature of the Younger Dryas (YD) abrupt climatic event in the West Pacific marginal seas are discussed on the basis of 15 sediment cores. This YD event has been found in all these cores studied with high-resolution stratigraphy and has proven to be common to the West Pacific region. As shown by isotopic and micropaleontologic analysis, the YD, dated by C-14 at about 11,000 to 10,000 years BP, is a brief event of sea surface cooling in the winter season following a fresh-water pulse about 12,000 years BP. The “apparent regression” of the YD recorded in the Changjiang River delta and the Sea of Japan agrees with the interpretation that the YD is a period of slowed sea level rising between two phases of rapid rising. Both the winter surface water cooling and the increasing salinity in the YD imply a strengthening of the winter but not of the summer monsoon circulation. This major climatic event in the marginal seas must have had profound impacts on the adjacent continent.

Keywords: Younger Dryas, West Pacific, marginal sea, deglaciation, paleoceanography

孙继敏, 刘东, 丁仲礼, 1996,
五十万年来毛乌素沙漠的变迁, 第四
纪研究, (4): 359-367

通过对陕西榆林石峁剖面(110°00'E,
37°55'N)地层记录的研究, 重建了毛
乌素沙漠的环境演变。主要结论如下
:(1)沙漠—黄土边界带风成沉积序
列中的埋藏古风成沙层, 是第四纪时
期毛乌素沙漠向其东南部的黄土高原
入侵的证据;(2)五十万年来石峁剖
面共记录了13层古风成砂, 表明这段
时间内至少有13次大规模的沙漠南侵
;(3)第四纪地质时期沙丘活化与固
定的多次转变反映了东亚季风环流的
变化;(4)石峁剖面顶部现代沙层的
集积很可能是历史时期土地不合理利
用的结果。

关键词: 五十万年 毛乌素沙漠
环境变迁

Sun Jimin, Liu Dongsheng, and Ding Zhongli.
1995. The Mu Us Desert evolution in the last
0.5 Ma. Quaternary Science (4):359-367.

A reconstruction of the environmental evolution
of the Mu Us Desert is based on a study of the
aeolian sequences at Shimao, Yulin City, Shanxi
Province. The results are as follows. (1) The
existence of buried sand layers in the eolian
sequences of the desert-loess transitional zone is
geological evidence of the southeastward
extension of Mu Us Desert. (2) During the last
0.5 Ma, 13 sand intercalations indicate 13
occurrences of desert expansion. (3) The
activation and stabilization of sand dunes in the
Mu Us Desert reflect the great change of the East
Asian Monsoonal Circulation. (4) The
accumulation of a modern sand layer at the top of
the Shimao section is likely the result of poor
land-use practice in historical time.

Keywords: 0.5 Ma, Mu Us Desert, environmental
evolution



冯起, 陈广庭, 朱震达, 1996, 塔克
拉玛干沙漠北部全新世环境演变
(1), 环境科学学报,
16(2): 238-244

本文分析了塔克拉玛干沙漠北部肖塘
剖面的粒度和元素, 讨论了剖面地层的
沉积特征、古气候和环境变化。结
论是, 本区全新世以来的多风、高温
、干燥的气候形成是以全球气候波动
为背景, 叠加内陆干旱封闭盆地影响
而形成的, 但在干燥气候条件下曾有
过几次空气湿度较大的偏湿期;本区
沉积相主要包括河流冲积作用形成的
粒土层和风力作用下形成的风沙层,
本区全新世以来共发生三次明显的河
流泛滥期, 可以同全新世以来的间冰
期对应。

Feng Qi, Chen Guangting, and Zhu Zhenda.
1996. Evolution of the Holocene environment in
the northern Taklimakan Desert (I). Acta
Scientiae Circumstantiae 16(2):238-244.

The evolution of the Holocene environment in the
northern Taklimakan Desert and the
characteristics of the sediment were revealed by
analyzing the granular characteristics and changes
in chemical composition of the Xiao Tang section
and determining the layer ages. The cold-dry and
warm-dry climate in the Holocene was created
under the background of global climate with
impact of local desert landscape. Also, the paper
reveals that there were several short humid
periods with high air-humidity during the period.
The sediment consisted of clay and sand layers,
and there were three fluvial flows in the study
areas mainly affected by mountain rainfall and
melting ice.

Keywords: Taklimakan, Holocene, layer,
sediment, environment

关键词: 塔克拉玛干 全新世 地层
沉积相 环境

王律江, 1996, 上新世末-
更新世初西太平洋变冷事件及其古气
候意义, 第四纪研究,
(4): 300-309

以浮游有孔虫目标转换方法, 利用时
间面与时间系列分析相结合, 本文讨
论了西太平洋上新世末2.6 Ma
BP以来古温度场的变化。结果表明
: 上新世末至更新世初, 西太平洋曾
经历一次大幅度, 不可逆降温过程。
变冷事件集中发生于2.4~1.0 Ma
BP间, 亚热带水团冬、夏降温幅度
达7~8°C和2~3°C, 热带水团则相对
稳定。西太平洋温度场巨变表明其在
北半球冰川发展过程中的正负反馈作
用, 并由此奠定了中、晚更新世冰期
旋回的全球气候模式。

关键词: 西太平洋 古温度
上新世末-更新世初
古气候及古海洋学



Wang Lujiang. 1996. Major temperature
decrease in the western Pacific during the late
Pliocene to early Pleistocene and its paleoclimatic
implications. Quaternary Sciences (4):300-309.

The distribution and changes of paleotemperature
for the last 2.6 Ma are discussed using a strategy
of combined time-series and time-slice analyses
based on the planktonic foraminifera (PF) faunal
data from eight Deep Sea Drilling Project (DSDP)
cores in the western Pacific (0-32°N, 124-159°E).
The estimated paleotemperature curves show a
major cooling during the late Pliocene to early
Pleistocene in the subtropical latitudes, with a
temperature decrease reaching 7-8°C and 2-3°C
stepwise and irreversible in nature. The results
indicate that the feedbacks of the Northern
Hemisphere glaciation both positive and negative
played an important role in the cooling.

Keywords: western Pacific, paleotemperature, late
Pliocene-early Pleistocene, paleoclimatology-
paleoceanography



丛绍光, 1996, 北美东部威斯康星中
、晚期古环境与气候变化的甲虫化石
证据, 第四纪研究, (4): 310-318

通过对北美东部威斯康星中、晚期的
甲虫化石组合的描述, 试图解释该区
环境和气候变化。甲虫分析表

Cong Shaoguang. 1996. Fossil beetle evidence
for middle and late Wisconsinan paleo-
environmental and paleoclimatic change in eastern
North America. Quaternary Sciences
(4):310-318.

Beetle assemblages of Middle and Late
Wisconsinan age are summarized with an attempt
to examine possible patterns of glacial climatic
change. Fossil beetle studies suggest that cold

明, 北美东部中纬度地区在威斯康星中、晚期的气候以寒冷为主, 中间分别在

42000a BP, 34000aBP 和28000aBP 出现3次明显的暖期。威斯康星中期气候冷暖波动的幅度和出现的时间可以与同期的格陵兰冰芯记录及北大西洋Herinrich事件对比。

关键词: 甲虫化石古环境气候变化
威斯康星冰期 末次冰期

climatic conditions were dominant in eastern North American between ca.45000-15000 years BP. During the Middle Wisconsinan time, three apparently short warm intervals occurred at ca. 42000 BP, 34000 BP, and 28000 BP. Middle Wisconsinan climatic changes in this area revealed by the fossil beetle record seem to correlate well with climatic records from the Greenland ice core and North Atlantic sediments.

Keywords: fossil beetle, paleoenvironment, climatic change, Wisconsinan, last glaciation



贾容芬, 赵林,

刘有梅, 1996, 黄土地区气候演变的有机地球化学标志, 地理科学, 16(2): 97-105

Jia Rongfen, Zhao Lin, and Liu Youmei. 1996. Organic geochemistry markers of climatic evolution in the loess region of China. Scientia Geographica Sinica 16(2):97-105.

对陕西渭南黄土剖面S0—L2段作了总有机碳(TOC)和Rock-Eval热解烃分析, 并根据实验数据建立0.14Ma来黄土地区有机质总量变化曲线。该曲线反映的变化周期与全球气候指标变化周期相近, 这表明黄土地区有机质总量变化可能受天文因素控制。在对热解烃与TOC的对比研究中发现, 黄土—古土壤序列中存在着两种类型烃, 它们的产生受不同因素影响, 可作为气候变化标志。此外还验证了黄土剖面湿度公式的可靠性, 计算出0.14Ma湿度变化范围为

47%—77%

及各层段湿度分布。预测认为当前正向湿度增大方向演变。

关键词: 渭南黄土剖面 有机质
气候演变 湿度

The total organic carbon (TOC) and Rock-Eval pyrolysis of samples from the Weinan loess section (S0-L2), Shaanxi Province were analyzed. It is believed that the TOC variation might be affected by astronomical factor, because the variation in TOC in the last 0.14 Ma parallels other indicators of global climate change. In the research, two kinds of hydrocarbon were found to be influenced by climatic change, which can be a signal of climatic change. After identifying the reliability of the formula calculating humidity, the researchers found the range of future humidity variation is 47%-77%, and the tendency of humidity is increasing now.

Keywords: Weinan loess section, organic matter, climatic evolution, humidity

奚晓霞, 穆德芬, 方小敏, 李吉均, 1996, 早更新世东山古湖氯离子含量变化与季风演化, 冰川冻土, 18 (2): 125-130

测定湖相沉积物中的氯离子含量可以反演当时流域内的古气候状况。经古地磁等多种年龄测定, 东山古湖是目前所知本段最高分辨率的湖相地层, 是恢复六盘山以西古季风演化的关键。东山古湖沉积物 (2.2-1.66 Ma BP) 中氯离子含量变化表明, 早更新世早期亚洲季风已稳定建立, 其变化较小。早期 (2.2-1.85 Ma BP) 较干; 中期 (1.85-1.7 Ma BP) 出现大湿润期, 氯离子含量最低; 晚期 (1.7-1.66 Ma BP) 再度变干。每个阶段中, 季风还存在约 2×10^4 a 的短周期波动。早期季风的演化明显受青藏高原隆起与地球轨道参数变化的双重影响。

关键词: 东山古湖 氯离子
早更新世 季风演化

郑本兴, 王苏民, 1996, 黄河源区的古冰川与古环境探讨, 冰川冻土, 18 (3): 210-218

黄河源区周围山地的古冰川作用与黄河源湖盆的沉积环境关系密切。黄河源区盆地北面的扎日加山、布青山、阿尼玛卿山和南面的巴颜喀拉山自中更新世以来有3次大冰期, 其中以倒数第三次冰川规模最大, 形成了4个大冰帽。中更新世开始, 盆地沉积中心由于昆仑山的隆起由北向南迁移, 从而形成了河源区下

Xi Xiaoxia, Mu Defen, Fang Xiaomin, and Li Jijun. 1996. Variation of Cl^- content in Paleo-Dongshan Lake during the early Pleistocene and monsoonal evolution. *Journal of Glaciology and Geocryology* 18(2):125-130.

The Cl^- content in lake sediments can show the paleoclimate of the valley. Variation of Cl^- content in the high-resolution Paleo-Dongshan Lake sediments (2.2-1.66 Ma BP) shows that the Asian monsoon system was stably established in the Early Pleistocene with a mild change. During this time interval, the monsoon climate showed three obvious phases, namely, relatively dry from 2.2 to 1.85 Ma BP, very humid from 1.85 to 1.7 Ma BP with the lowest content of Cl^- , and dry again from 1.7 to 1.66 Ma BP. In addition, a 20-ka cycle of Cl^- variation is also evident in each phase. These phases indicate that the evolution of the early monsoon climate may have been caused by the uplift of the Tibetan Plateau and earth orbital forcing.

Keywords: Paleo-Dongshan Lake, anion chlorine, Early Pleistocene, monsoonal evolution



Zheng Benxing and Wang Sumin. 1996. A study on the paleo-glaciation and paleoenvironment in the source area of the Yellow River. *Journal of Glaciology and Geocryology* 18(3):210-218.

The paleo-glaciation in the mountain area of the source of the Yellow River shows a relationship with the deposition environment of the lake basin area of the Yellow River. During the Cahaxili Glaciation of the middle Pleistocene, there were glaciers developing in the Bayan Har, Zarijia, Buqingshan, and Anyemaqen Mountains and four big ice caps with a diameter of about 30-50 km. Up to the late stage of the middle Pleistocene penultimate glaciation, glaciers extended downward to the valleys and Ngoring Lake was a large glaciofluvial lake. During the last glaciation of the late Pleistocene, medium valley glaciers

相沉积。晚更新世末次冰期时湖水外泄,进入若尔盖盆地,黄河水系开始成为一体。全新世黄河曲折东流,本区形成广大的高寒干旱草原丘陵盆地地貌景观。

关键词: 古冰川 古环境 黄河源区

developed in the mountains and the climate was cold and dry with strong wind. The Yellow River system became connected and a large amount of water with sand from lake area of the source of the Yellow River ran into the Zoige Lake area. In the middle of the Holocene, the lake area greatly shrank and a large lake bench and valley plain with a dry grassland appeared and meanders in the Yellow River were developing.

Keywords: paleoglacier, paleoenvironment, source area of Yellow River



沈永平, 刘光秀, 施雅风,
张平中, 1996, 青藏高原新仙女木事件的气候与环境, 冰川冻土,
18(3): 219-226

Shen Yongping, Liu Guangxiu, Shi Yafeng, and Zhang Pingzhong. 1996. Climate and environment in the Tibetan Plateau during the Younger Dryas cooling event. Journal of Glaciology and Geocryology 18(3):219-226.

末次冰期以来极地冰芯、海洋沉积等记录中观测到的最剧烈的气候突变事件之一就是新仙女木事件。近年来的研究表明发生于11-10ka BP的新仙女木降温事件呈全球性变化,青藏高原在这一事件中气候与环境也发生了急剧的变化。青藏高原巨大的高度和脆弱的冰冻圈结构使新仙女木事件的敏感性和作用被放大了,这对同纬度地区和全球都产生了极大的影响。

关键词: 青藏高原 新仙女木事件
气候变化 环境

The Younger Dryas cooling event was a global event occurring in 11-10 ka BP. Field evidence with well-dated and high-resolution data suggests the occurrence of the event in the Tibetan Plateau. During the event an abrupt and dramatic climatic and environmental change also took place in the plateau. The main changes in the plateau were cooling, drying, dropping of lake level, extending period of river and lake ice cover, and weakening intensity of plateau monsoon. Ecological conditions became more fragile, vegetation and aquatic life vanished or decreased in species, and glaciers readvanced. Because of the high altitude and the fragility of the cryosphere, the sensitivity and scope of the event were enhanced in the plateau, and are more distinct than in other places at the same altitude or globally.

Keywords: Tibetan Plateau, Younger Dryas event, climate change, environment

陈发虎, 马玉贞, 李吉均, 1996,
陕西黄土高原马兰黄土划分与末次冰
期气候快速变化研究, 冰川冻土,
18 (2): 111-118

本文对陕西黄土高原马兰黄土划分与末次冰期气候快速变化做了研究, 发现马兰黄土内存在9个弱成壤组(层), 记录了末次冰期内多达22个间冰段气候的环境状况。马兰黄土中部古土壤是末次冰期大间冰段的记录, 共有上、中、下三层古土壤, 含11个亚层, 尤以下层古土壤发育最好, 表明当时气候较温暖湿润。陕西马兰黄土记录与格陵兰GRIP冰芯记录相吻合, 说明末次冰期内气候快速变化和不稳定性具有全球意义。

关键词: 末次冰期 马兰黄土记录
古土壤序列间 冰段
末次冰期气候不稳定性

Chen Fahu, Ma Yuzhen, and Li Jijun. 1996.
High-resolution record of Malan loess in the
Longxi Loess Plateau and rapid climate changes
during the Last Glaciation. *Journal of Glaciology
and Geocryology* 18(2):111-118.

Loess deposition in the plateau is quite sensitive to environmental and/or climatic changes. Because it is relatively thick and widely distributed in the Longxi Loess Plateau, the loess climate record has high resolution. There are 22 weak pedogenic layers in the Malan loess. They are records of interstades in the last glaciation. From pedogenic structures, magnetic susceptibility index, pollen and spore composition, and others it is known that climates in the interstades were relative warm and moist. The Malan loess record is quite coincident with the Greenland Ice Core Project (GRIP) ice core record, reflecting the generally instable climate for whole globe during the Last Glaciation. In middle part of the Malan loess there is a thick interstadial pedogenic layer with three main paleosols. The climate in the period was quite moist and possibly as warm as at present in some periods especially as evident in the bottom paleosol formation. In Western China, the water level of inland lakes was higher than that of the present. The interstade in China appeared as a Mega-interstade.

Keywords: Last Glaciation, Malan loess record,
paleosol sequence, Mega-interstade, climatic
instability during the Last Glaciation



李宜银, 吕金福, 1996,
松嫩沙地晚更新世以来的孢粉记录及
古植被古气候, 中国沙漠,
16(4): 338-344

松嫩沙地位于中国北方半干旱半湿润
农牧交错带, 研究该地区植
被演替历史和古气候变迁对未来生态
环境评价、农牧业发展、资源利用有
重要意义。本文对松嫩沙地进行了孢
粉、古脊椎动物、¹⁴C、热释光年代
等分析, 结果表明这个地区从晚更新
世以来植被曾发生过多次

Li Yiyin and Lu Jinfu. 1996. The sporo-pollen
records and vegetation and climate history in
Songnen Plain since Epi-pleistocene. *Journal of
Desert Research* 16(4):338-344.

The Songnen Plain is located on the semiarid-semihumid fringe in northern China. The formation and development of this area have a long geologic and historic process. The sporo-pollen records of this region indicate that the vegetation in this area has a succession of semidesert, semidesert grassland, grassland, sparse woods grassland, and dry grassland, and the climate has been changing between cold (dry) and warm (wet), along with which the desertified land expanded or reduced since the Epi-pleistocene.

更替, 经历了半荒漠-(半荒漠草原)-
疏林草原-干草原的演替,
气候经过多次冷暖波动, 沙漠化也经
历了多次扩张和收缩。

关键词: 松嫩沙地 晚更新世
孢粉记录 古环境

Keywords: Songnen Plain, Epi-pleistocene,
pollen and spore record, paleoenvironment



高全洲, 董光荣, 邹学勇,

1996, 查格勒布鲁剖面一

晚更新世以来东亚季风进退的地层记
录, 中国沙漠, 16(2): 112-126

Gao Quanzhou, Dong Guangrong, and Zou
Xueyong. 1996. The Chagelebulu Section: A
strata record of the advances and retreats of
monsoons in East Asia since the late pleistocene.
Journal of Desert Research 16(2):112-126.

本文结合 ^{14}C 测年、古冰缘现象和沉
积物在化学元素 $\text{SiO}_2/\text{Al}_2\text{O}_3$ 分子比值
变化规律分析了查格勒布鲁剖面沉积
物的粒度特征和孢粉组合特征。晚更
新世以来巴丹吉林沙漠南缘地区的气
候条件随全球冰期气候的波动经历了
由晚更新世早期的相对温湿阶段、晚
更新世晚期尤其是末次盛冰期的干冷
阶段向全新世温暖期的演化过程。东
亚夏季风尾闾在晚更新世早期到达甚
至越过本区影响到拐子湖一带, 全新
世以来东亚夏季风尾闾又向本区推进
, 并于全新世大暖期对本区造成明显
影响。

关键词: 查格勒布鲁剖面 晚更新世
东亚季风 古风成砂 沉积

Evidence of climatic stratigraphy can divide the
climatic evolution in south of the Badain Jaram
Desert into three stages since late Pleistocene.
There are two warmer and moist ones in the early
stage of Late Pleistocene (Q1/3) and in the
Holocene (Q4), and a dry and cold stage in the
late stage of the Late Pleistocene (Q2/3). During
the late interglacial period (Q1/3), the fringe
extended its range to Guaizihu, which lies to the
north 180 km away from Chagelebulu. During the
last glacial period, the winter monsoon dominated
the climate in this area; the summer monsoon
fringe, however, retreated to the middle-lower
reaches of the Changjiang drainage basin, and the
landscape turned to temperate desert.

Keywords: Chagelebulu section, late pleistocene,
East Asia monsoons, Eolian paleosands,
deposition

管东红, 奚晓霞, 郝永萍等, 1996, 北塬剖面碳酸钙记录的末次间冰期气候不稳定性, 冰川冻土, 18 (2): 119-124

最近格陵兰冰芯深孔GRIP提示末次间冰期早期(MIS-5e)气候急剧不稳定, 但邻近的另一冰芯GISP2却表明这一时期气候是稳定的。其结论对将来气候的预测至关重要。由于 CaCO_3 在黄土和古土壤中含量的差异性, 及北塬特殊的地理位置和气候环境, 决定了北塬黄土—古土壤序列中 CaCO_3 (%)记录与格陵兰冰芯 $\delta^{18}\text{O}$ (‰) 记录理论上具有可比性, 连续 CaCO_3 记录表明, 气候在MIS-5e期间曾发生3次显著的温暖时期和两次明显严寒的急剧大幅度波动。与格陵兰GRIP孔气候记录一致。证明MIS-5e气候不稳定性是存在的, 并且其影响不是原先认为的局地事件, 至少是北半球的一种普遍现象。

关键词: 北塬 末次间冰期 冰芯深孔 气候波动

姚檀栋, 杨志红, 1996, 近2Ka来高分辨率的连续气候环境变化纪录—古里雅冰芯近2Ka记录初步研究, 科学通报, 41 (12): 1103-1106

根据古里雅冰芯的记录, 恢复了该地区近2Ka的气候和环境变化的历史。结果显示: 在过去近2Ka来, 气候在不断的冷暖波动中逐渐变暖, 而大气中尘埃在波动中逐渐减少。气候突变事件在古里雅冰芯中的反应是很明显的, 这些事件不但发生在

Guan Donghong, Xi Xiaoxia, Hao Yongping, et al. 1996. Climate instability revealed in the Beiyuan CaCO_3 record during the Last Interglacial Age. Journal of Glaciology and Geocryology 18(2):119-124.

Recent Greenland Ice Core Project (GRIP) deep ice core records reveal that the climate experienced short shifts during the early stage of the Last Interglacial Age [Marine Isotopic Stage (MIS)-5e], but the later ice core from the Greenland Ice Sheet Project Two (GISP2) near the GRIP drill has not demonstrated such a phenomenon. The difference in calcium carbonate (CaCO_3) content between loess and paleosol and the special location and environment of the Beiyuan area theoretically make it possible to compare Beiyuan loess-paleosol CaCO_3 (%) to the Greenland ice core oxygen isotope record ($\delta^{18}\text{O}$) (‰). The continuous loess-paleosol CaCO_3 (%) record from the Beiyuan section shows that the climate experienced three warm periods and two serious cold periods, which was a marked fluctuation and correlated well with the Greenland GRIP climate record. This correlation demonstrates the instability of climate existence during the MIS-5e and shows that this climate fluctuation was common at least over the Northern Hemisphere rather than being local as previously recognized.

Keywords: Beiyuan, the Last Interglacial Age, deep ice core, climate fluctuation



Yan Tandong and Yang Zhihong. 1996. The high-resolution record for climatic variation during the last 2000 years: Preliminary research on the Guliya Ice Core. Chinese Science Bulletin 41(12):1103-1106.

This paper reports the reconstruction of climatic and environmental change during the last 2000 years using the records from the Guliya ice core. The results show that the climate has been warming with continuous fluctuations of warm/cold and that dust has been decreasing. The abrupt climatic changes are notable, those events occurred not only in the fluctuation from cold to warm but also in the fluctuation from warm to cold.

气候由冷变热的时期,也发生在由热变冷的时期。

关键词: 古里雅 冰芯 气候 环境

Keywords: Guliya, ice core, climate, environment



郭正堂, 丁仲礼,

刘东生, 1996, 黄土中的沉积-成壤事件与第四纪旋回, 科学通报, 41(1): 56-59

Guo Zhengtang, Ding Zhongli, and Liu

Dongsheng. 1996. Pedosedimentary events in loess of China and Quaternary climatic cycles. Chinese Science Bulletin 41(1):56-59.

基于渭南剖面,用微形态学方法,结合游离铁(CBD法分离)和总铁比值、磁化率,对2.5Ma以来的成壤事件进行鉴别。2.5Ma以来的渭南黄土中至少记录了56个清晰的成壤期。如果把每个成壤期和相对干冷的粉尘堆积期作为一个气候事件,则它们代表了112个以沉积-成壤事件为代表的古气候事件。

关键词: 黄土-古土壤序列
成壤事件

The pedosedimentary events of the last 2.5 Ma are revealed in the Weinan loess section using a micromorphological method, together with Fed/Fet and magnetic susceptibility. At least 56 paleosols have been easily identified in the Weinan loess. If all pedogenetic stages and dust deposition stages are viewed as climatic events, 112 paleoclimatic events are expressed by those paleosols in the Weinan loess.

Keywords: loess-paleosol sequence, polycyclic soil, pedosedimentary event



杨守仁,

杨松, 1996, 中国10Ka来海滩岩时空分布与气候变迁, 科学通报, 41(8): 723-727

Yang Shouren and Yang Song. 1996. Temporal and spatial distribution of seabeach rock and climatic change in China during the last 10000 Years. Chinese Science Bulletin 41(8):723-727.

基于海滩岩形成与热带气候条件的密切关系,中国全新世海滩岩的时空分布表明,在百年尺度上,中国全新世气候变化经历了升温期、高温期和降温期三大阶段。高温期气候基本偏暖,气温比今高1.6-

3.6°C,其间出现短暂的强低温事件(冷谷为4930+185aBP),降温期气候前期(11KaBP前)尚暖,气温高于现在0.5-2.2°C,后期(11KaBP后)

Temporal distribution and spatial distribution of beach rock in China show that, on the scale of a century, climatic change has experienced warming periods, high temperature periods, and cooling periods during the Holocene. During warming periods, the climate was warmer and the temperature was 1.6 to 3.6°C higher than it is at present, and a cold event occurred at 4930 ± 185 a BP. The cooling period has two stages: before 1.1 ka BP, temperature was 0.5 to 2.2°C higher than present; after 1.1 ka BP, the temperature had an abrupt drop. According to the data of beach rock since 6.5 ka BP, the major period of temperature fluctuation was 0.2 ka, and the rate of temperature variation is 0.5 to 1.7°C.

陡降, 气温比今高0-0.19°C。

根据6.5KaBP以来海滩岩数据, 冷谷变暖峰、暖峰变冷谷的时间间隔以0.2Ka为主, 为次, 气温变化为每百年0.5-1.7°C,

推断新暖峰将在未来0.1Ka出现, 在一般情况下, 那时气温将比今高约0.5-1.7°C, 也可能突然升高2.8°C。

关键词: 中国海滩岩 时空分布
气候变迁

Prediction shows that a peak of warmth will occur in 0.1 ka, when the temperature will be 0.5 to 1.7°C higher than at present.

Keywords: beach rock in China, temporal and spatial distribution, climatic change



汪品先,

刘志伟, 1996, 南沙海区盛冰期的气候问题, 第四纪研究,
(3): 193-201

本文根据十几个沉积柱状样的氧同位素与微体古生物分析结果, 指出南沙海区盛冰期时夏季温度与全新世差别微小, 而冬季水温强烈降低, 使季节性温差高达6°C, 明显超过同纬度的西太平洋开放水域。推测冰期时的冬季风强化, 是造成这些变化的主要原因, 同时也为热带海区冰期海面温度高、岛屿山地温度低的矛盾提出了一种新的解释。

关键词: 南沙海区 表层海水温度
盛冰期 冬季风

Wang Pinxian and Liu Zhiwei. 1996. The last glacial maximum climate problem in the sea area of the Nansha Islands, South China Sea. Quaternary Sciences (3):193-201.

Judging from the results of oxygen-isotope and micropaleontological analyses from more than ten cores, this paper shows that the winter sea surface temperature (SST) at the Last Glacial Maximum (LGM) in the Nansha Islands sea area was about 22°C and the summer SST was about 28°C, resulting in a seasonality as high as 6°C. Thus the glacial/postglacial difference in summer SST (0.9 to 1.8) there is within the range of standard errors for the paleo-SST estimations using transfer function, where the difference in winter SST (3.3 to 3.7) is much higher than in the open Western Pacific at the same latitudes. The strengthened seasonality in the Nansha area at the LGM can be ascribed to intensified winter monsoon circulation. This also provides a new explanation for the apparent contradiction between the warm SST and cool mountain temperature of the islands in the tropics at the LGM.

Keywords: Nansha Islands area, sea surface temperature, Last Glacial Maximum, winter monsoon

聂高众, 刘嘉麒,

郭正堂, 1996, 渭南黄土剖面十五万年以来的主要地层界线和气候事件, 第四纪研究, (3): 221-231

本文在渭南黄土剖面所测得的年龄结果和时间标尺的基础上, 结合粒度、磁化率等气候曲线的分析, 对该剖面十五万年以来一些主要地层界线和气候事件的年龄进行了初步讨论, 结果如下: 1) S_1/L_2 界线位于剖面1180cm处, 从时间标尺上可知其年龄为128800aBP, 同末次间冰期起始的年龄一致; 2) L_1/S_1 的地层界线年龄为74220aBP, 同SPECMAP曲线中末次间冰期的结束年龄吻合; 3) 渭南剖面所指示的末次间冰期约在20000-18000aBP之间; 4) 在20000-18000aBP之间的末次间冰期, 有一段不足1000a的快速堆积期, 其堆积速率是中国黄土平均堆积速率的10倍以上。

关键词: 渭南剖面 年代学
地层界线 气候事件

Nie Gaozhong, Liu Jiaqi, and Guo Zhengtang. 1996. The major stratigraphic boundaries and climatic events in the Weinan Loess section since 0.15 Ma BP based on chronological evidences. Quaternary Sciences (3):221-231.

The American Meteorology Society (AMS) C and TL methods were used systematically to date the samples from the Weinan loess section since 0.15 Ma BP, and to tune the preliminary high-resolution time scale of this section. (1) The S_1/L_2 boundary was located at a 1180cm depth that has an age of 128800 a BP determined by the time scale, which was very consistent with the SPECMAP curve. (2) The boundary of L_1/S_1 at a 854-cm depth may suggest an age of 74200 a BP from the time scale. This age corresponds to the age of about 73000 a BP in the SPECMAP curve. (3) The maximum of the last interglacial stage had an age from about 20000 a BP to 18000 a BP. (4) There was a rapid deposit period in the Weinan loess section from 20000 a BP to 18000 a BP. The deposit rate of this segment was more than 10 times the average deposit rate of China loess.

Keywords: Weinan section, chronology, stratigraphic boundary, climatic event



赵松龄, 于洪军, 1996, 晚更新世末期黄、渤海陆架沙漠化环境的形成, 第四纪研究, (1): 42-47

末次盛冰期气候寒冷, 温度降低, 冰川发育, 海面下降, 黄、渤海陆架全部出露, 东海的大部分裸露成陆, 并成为亚洲大陆的一部分。根据多年来在陆架地区获得的浅地层剖面仪测量记录, 陆架发生沙漠化的证据有: 统一海相地层的解体、大面积的混杂堆积、漫长的风蚀基面、休止角型沉积

Zhao Songling and Yu Hongjun. 1996. Shelf desertification environment in the Bohai and Yellow Seas during the Last Glacial Maximum. Quaternary Sciences (1):42-47.

During the Last Glacial Maximum, the global climate was characterized by very low temperatures. Enlargement of the continental glaciers brought about the lowering of the East China Sea level for about 130 m. The entire Bohai Sea, Yellow Sea, and most of the East China Sea were exposed and became a part of the Asian continent. The evidence for the shelf desertification is summarized as follows: (1) Disintegration of the integrated marine stratum; (2) mixed deposits; (3) endless erosion surface;

结构以及埋藏沙丘群的发现等。
关键词：陆架沙漠化

(4) typical "angle of repose" texture; and (5) buried dune groups.

Keywords: shelf desertification



成鑫蓉, 麦文, 1996, 南海北部陆架 WC-F
孔早、中上新世超微化石及古环境, 海洋学报, 18(1): 73-79

在对南海北部陆架 WC-F 孔超微化石分析的基础上, 对早、中上新世的古环境作了一初步探讨。490-850m 井段在超微化石分带上属 NN12 至 NN15 带。以 730m 为界, 可分为早晚两个阶段。早期气候温暖, 海面较高, 生物生产力较低, 以星盘石 *Discoster* 和冷杉石 *Sphenolithus abies* 较高含量为特征; 晚期气候较冷, 海面下降, 陆源物携带之营养物质增多, 生物生产力增高, 以星盘石和冷杉楔石含量下降为标志。根据星盘石的相对丰度变化, 还可分为 10 个次一级的冷暖旋回。

关键词：南海 超微化石 古环境

Cheng Xinrong and Mai Wen. 1996. The microfossil and its paleoenvironment in the core WC-F from the North Continental Slope of the South China Sea. *Acta Oceanologica Sinica* 18(1):73-79.

Based on an analysis of nannofossils in core WC-F from the North Continental Slope of the South China Sea, the paleoenvironment during early and middle Pliocene is studied. The core from 490 m to 850 m belonging to sections NN12 to NN15 can be divided into two stages at 730 m. In the early stage, the climate is warmer, and sea level is higher; biological productivity is lower and the abundance of *Discoster* and *Sphenolithus abies* is higher. In the later stage, sea levels fall, and nutrients taken by terrigenous materials increase; biological productivity is enhanced and the abundance of *Discoster* and *Sphenolithus abies* decrease. There are ten secondary cycles of warm/cold according to the relative abundance of *Discoster*.

Keywords: South China Sea, nannofossil, paleoenvironment



李道高, 郭永盛, 姜爱霞, 1996, 山东半岛南、北岸全新世海侵及古地理环境差异的初步探讨, 海洋学报, 18(4): 63-71

根据山东半岛沿岸大量全新世海相沉积物的分布高程。测年数据及孢粉分析结果, 分析了半岛南、

Li Daogao, Guo Yongsheng, and Jiang Aixia. 1996. A preliminary discussion on the differences of the paleoenvironment in the Holocene between the southern and northern coasts of the Shandong peninsula. *Acta Oceanologica Sinica* 18(4):63-71.

The differences of transgression, paleovegetation, paleoclimate, and paleoenvironment during the Holocene between the southern and northern coasts of the Shandong peninsula are analyzed on the basis of the altitude of deep-sea sediment, dating data, and pollen analysis. Those differences

北岸全新世时期海侵, 古植被与古气候及古地理环境有显著差异, 其形成原因主要归结于新构造运动背景和地理纬度差异等因素。

关键词: 山东半岛 全新世海侵
古地理环境

are chiefly contributed to tectogenesis and the difference of latitude.

Keywords: Shandong peninsula, transgression in Holocene, paleoenvironment



谢传礼,

剪知缙, 1996, 末次盛冰期中国海古地理轮廓及其气候效应, 第四纪研究, (1):1-10

本文用101个站位 ^{14}C 的测年和22个站位的氧同位素资料编制了末次盛冰期(20000-15000aBP)资料图、古地理图和古海洋图等三张图件。末次盛冰期低海平面时中国海轮廓发生重大改观: 陆架出露约 1.55×10^6 平方公里; 表层海流改组以及表层海水温度剧降(比现代低3.5-6℃)。海区面积和表层海水温度下降使中国海蒸发量大大降低。根据海陆蒸发速率差异和表层海水温度和蒸发的关系, 估算出末次盛冰期中国海年蒸发量比现代降低约 12×10^{11} - 20×10^{11} 立方米/年, 或相当现代中国年降水量的1/5-1/3。同时, 末次盛冰期陆架暴露、地表反照率增高使地表对太阳辐射吸收作用减弱。

关键词: 末次盛冰期 古地理
中国海 反照率

Xie Chuanli and Jian Zhimin. 1996. The paleogeographic configuration of the China Seas and its climatic influence during the Last Glacial Maximum. Quaternary Science (1):1-10.

Over one-hundred sites with ^{14}C -datings and 22 sites oxygen isotope data have been collected to compile paleogeographic maps of the China Seas during the Last Glacial Maximum (LGM) of 20000-15000 a BP. A series of 3 draft maps (data map, paleogeographic map, and paleoceanographic map) were made. The paleogeographic map at the Last Glacial Maximum revealed two major changes of the China Seas caused by the low sea-level stand. (1) The exposure of vast continental shelves in a total area of about 1.55 million km^2 ; and (2) the reorganization of surface circulations and remarkable decrease of sea surface temperature (SST). Both the reduction of sea area and decline of SST must have caused a decrease in evaporation from the sea surface. On the basis of the difference between evaporation rates from sea and land and the relationship between evaporation and SST, the authors draw the following results. It is estimated that the total annual evaporation from the China Seas at the LGM might be 12×10^{11} - $20 \times 10^{11} \text{ m}^3/\text{a}$ less than at present, or 1/5 to 1/3 of the annual total precipitation in the whole of China now. On the other hand, the exposure of shelves at the LGM must have increased the albedo from the surface and hence decreased the absorbed solar radiation.

Keywords: the Last Glacial Maximum, paleogeography, the China Seas, albedo

Climate Variation (season and year)

宫世贤, 凌升海, 1996, 西双版纳雾在减少, 气象, 22(11): 10-14.

利用西双版纳40年雾的实测资料, 统计分析了西双版纳的雾日、雾时、雾量的变化情况, 探讨了雾减少的原因及其对人们生产、生活带来的影响。雾减少的直接原因是相对湿度的降低, 而相对湿度的降低是由于气温升高和降水量的减少。植被减少和城市热岛效应的增强是西双版纳雾迅速减少的人为原因。

关键词: 雾减少 西双版纳
人类活动

Gong Shixian and Ling Shenghai. 1996. Fog is decreasing in the Xishuangbanna Region. Meteorology Monthly 22(11):10-14.

The days, hours, and amount of fog in the Xishuangbanna region are analyzed using observation data for the last 40 years. It is found that the fog of Xishuangbanna is decreasing as a result of increasing air temperature and decreasing precipitation. The paper points out that the reduced vegetation and an enhanced city heat-island effect are the artificial causes of fog decrease in the Xishuangbanna region.

Keywords: fog decreasing, Xishuangbanna, human action



胡列群, 袁玉江, 1996, 塔克拉玛干沙漠辐射平衡研究, 干旱区地理, 19(3):16-23.

通过对塔克拉玛干沙漠辐射平衡实测值与计算值对比分析, 本文研究了辐射平衡不同季节的日变化及年变化特征, 分析了影响辐射平衡的各主要因子。结论是, 塔里木盆地中心日益扩大的沙漠地区是整个盆地年辐射平衡的低值中心, 也是整个新疆辐射平衡年总量的低值中心。

关键词: 塔克拉玛干沙漠 辐射平衡

Hu Liequn and Yuan Yujiang. 1996. A study of the surface radiation balance in the Taklimakan Desert. Arid Land Geography 9(3):16-23.

Through comparison of simulation with observation, the daily and yearly variations of the radiation balance in different seasons in the Taklimakan Desert are studied, and major factors that affect radiation balance are discussed. The results show that the lowest center of annual radiation balance in Xinjiang is at the center of the Taklimakan Desert and its value is about $1100 \text{ MJ} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$.

Keywords: Taklimakan Desert, radiation balance

蒋全荣, 王春红, 徐桂玉, 1996, 北极1区海冰面积变化及其与大气遥相关型的联系, 气象学报, 54(2): 240-247

EOF和功率谱分析表明, 北极1区海冰面积的第2、第3特征向量的年际变化具有40个月左右的振荡周期。在这一频带上, 海冰面积变化的热力强迫作用可分别激发出EU和EA大气遥相关型。经对比, 进一步发现, 北极海冰和赤道中、东太平洋海温对北半球冬半年中纬度大气环流的影响有一定的相似性, 它们都是引起短期气候变化的重要因子。

关键词: 北极1区海冰面积

EU和EA大气遥相关型 短期气候变化

Jiang Quanrong, Wang Chunhong, and Xu Guiyu. 1996. Variation of the Arctic sea ice cover in Region 1 and its relationship to atmospheric teleconnection patterns. Acta Meteorologica Sinica 54(2):240-247.

Empirical orthogonal function (EOF) and power spectral analysis show that the interannual variability of the time coefficients of the second and the third eigenvectors of the Arctic sea ice cover in Region 1 has a period of approximately 40 months. At this frequency band, EU and EA teleconnection patterns can be excited by the thermal forcing of the variation of the sea ice cover. By comparison it is confirmed that the influence of the Arctic sea ice cover on the mid-latitude general circulation in the Northern winter parallels sea surface temperature (SST) over the central-eastern equatorial Pacific. Sea ice cover and SST are the important factors in the short-term climatic change.

Keywords: Arctic sea ice cover in Region 1, EU and EA atmospheric teleconnection patterns, short-term climatic change



林振耀, 赵昕奕, 1996, 青藏高原气温降水变化的空间特征, 中国科学, 26(4): 354-358

利用青藏高原50个台站历年各月的气温和降水资料, 分析该区50年代至90年代初气温降水变化趋势。指出西藏、青海气温普遍呈上升趋势, 具有较强的空间一致性。西藏东南部暖期开始最早。可将全区划为5个气温和9个降水变化特征相异的小区。全区温湿组合以增温减湿为主。

关键词: 气温降水变化的空间特征

青藏高原地区 50年代至90年代初期

Lin Zhenyao and Zhao Xinyi. 1996. Spatial characteristics of changes in temperature and precipitation of the Qinghai-Xizang (Tibetan) Plateau. Science in China (Series D) 26(4):354-358.

The changing processes and tendencies of temperature and precipitation in Qinghai-Xizang Plateau from the 1950s to the early 1990s are analyzed on the basis of monthly mean temperature and precipitation. The change of temperature in the last 40 years is almost unanimous on the spatial scale. The first area to become warmer is the southeastern Tibetan Plateau. The Plateau is divided into five parts according to the change of temperature and nine parts according to the change of precipitation. During the 40 years some areas have been warmer and drier, others warmer and wetter.

Keywords: spatial characteristics of temperature and precipitation change, Qinghai-Xizang Plateau, 1950s to early 1990s

刘爱民, 刘玉平, 慈龙骏, 1996, 毛乌素沙区的气候变化及人为活动特征分析, 干旱区资源与环境, 10(4):8-18

利用毛乌素沙区10个气象站近30年的气象资料和国民经济统计资料, 分析了该区的气候变化特征和人为活动特点, 并提出了适应该种变化的对策。结果表明, 该30多年来气温抬升, 降水量下降, 但降水稳定性增强, 平均风速减少; 实现农牧业生产由粗放经营向集约化经营转变, 提高该区综合生产能力, 是防止农业生态环境进一步退化的重要措施。

关键词: 气候变化 人为活动
生态环境

Liu Aimin, Liu Yuping, and Ci Longjun. 1996. Analysis of characteristics of climatic variation and anthropogenic actions in the Mu Us Desert. *Journal of Arid Land Resources and Environment* 10(4):8-18.

Characteristics of climatic variation and anthropogenic actions in the Mu Us Desert are analyzed by using statistical data of climate and the national economy for about 30 years from ten climatological stations. Research results show that over these years, temperature has gone up and precipitation has gone down, but the stability of precipitation has strengthened and average wind speed has decreased. Countermeasures for these changes are proposed. Changing agriculture and animal husbandry from extensive farming into intensive farming and increasing the production capacity are the main measures to prevent the agricultural ecological environment from degeneration.

Keywords: climatic variation, artificial action, ecological environment



刘禹, 吴祥定, S. W. Leavitt, 1996, 黄陵树木年轮稳定C同位素与全球变化, 中国科学, 26(2): 125-130

本文在树轮稳定C同位素与气候变化的研究方面做了新的尝试。本文采用不同的数据分析方法, 研究了消除大气CO₂影响后的陕西黄陵境内的油松树轮中 $\delta^{13}\text{C}$ 与气候因子之间的关系及其稳定程度。结果表明: 黄陵地区的 $\delta^{13}\text{C}$ 曲线表现出与全球其他地区一致的下降趋势。黄陵地区高频 $\delta^{13}\text{C}$ 的震荡与6月平均气温及5月、6月和7月3个月的降水总和密切相关。在一定程度上反映了东亚夏季风这一地区的某些特点。

关键词: 陕西黄陵 树轮 $\delta^{13}\text{C}$
东亚夏季风 温度距平重建

Liu Yu, Wu Xiangding, and S. W. Leavitt. 1996. Stable carbon isotope in tree rings from Huangling, China, and climatic variation. *Science in China (Series D)* 26(2):125-130.

The carbon isotope $\delta^{13}\text{C}$ in the tree rings of conifers correlates with nearby temperature. The $\delta^{13}\text{C}$ climatic response is analyzed using a single-year discrimination chronology detrended from a $\delta^{13}\text{C}$ chronology from Chinese pine (*Pinus tabulaeformis*) tree rings and meteorological data. The results show that high-frequency $\delta^{13}\text{C}$ is significantly related to both the average temperature of June (with $r = -0.65$) and the total precipitation of May, June, and July ($r = -0.46$).

Keywords: Shanxi Huangling, $\delta^{13}\text{C}$ of tree rings, East Asia summer monsoon, temperature departure reconstruction

刘晓东, 马柱国, 1996,
中国短期气候变化的一个重要原因—
青藏高原地表反射率的变化, 热带气
象学报, 12(3): 240-245

通过数值试验, 对高原地表反射率变
化的气候效应进行了敏感性研究,
同时与观测的近40年中国区域气候变
化趋势作了对比分析。结果表明,
高原主体地表反射率增加是我国短期
气候变化的重要控制因子之一,
它能造成东亚夏季风和高原夏季风的
显著减弱,
使夏季我国东部季风区北方变暖,
南方变冷, 季风降水普遍减少。
关键词: 青藏高原 地表反射率
气候变化

Liu Xiaodong and Ma Zhuguo. 1996. An
important cause leading to short-term climatic
variation in China: The change of the surface
albedo in the Tibetan Plateau. Journal of Tropical
Meteorology 12(3):240-245.

A sensitivity study on the climatic effect of
surface albedo change is completed with a two-
level General Circulation Model, and the results
are compared with the data from observation in
the last 40 years. The results show that the
increase of the surface albedo in the main part of
the Tibetan Plateau is one of the important factors
in controlling China's short-term climatic
variation. When the surface albedo increases in
the Tibetan Plateau, the summer monsoon
becomes remarkably weak, and the temperature
rises in the northern part and falls in the southern
part of eastern China, and monsoonal rainfall also
decreases generally.

Keywords: Tibetan Plateau, surface albedo,
climatic variation



施能, 1996, 北半球冬季大气环流遥
相关的长期变化及其与我国气候变
化的关系, 气象学报,
54(6): 675-683

研究北半球冬季大气环流遥相关型的
长期变化发现: WA、PNA型有明显
趋势变化及年代际变化(WA型有明
显负趋势, PNA型有正趋势)。这种
年代际变化是中国冬季气候变化的
一个重要原因。

关键词: 冬季遥相关型 年代际变化
突变 气候变化

Shi Ning. 1996. Secular variation of winter
atmospheric teleconnection pattern in the
Northern Hemisphere and its relationship with
China's climate change. Acta Meteorologica
Sinica 54(6):675-683.

The secular variation of the winter atmospheric
circulation teleconnection pattern is studied. The
Western Atlantic (WA) and Pacific/North
American (PNA) patterns showed yearly trends
and interdecadal change, that were a significant
negative trend for the WA intensity index and a
positive trend for the PNA intensity index. This
interdecadal change of the intensity indices of the
atmospheric teleconnection pattern may be an
important sign of climatic warming over China in
winter.

Keywords: winter teleconnection, interdecadal
change, abrupt change, climate change

谭友邦, 谢利娟, 1996, 内江市近40年日照变化的统计特征, 气象, 22 (10): 27-30

利用1960-

1995年内江市各测站的逐月日照时数资料, 分析了内江近40年来日照的变化特征。发现, 区域平均年总日照时数正以 -46.98

小时/10年的倾向率减少, 四季均有减少的趋势, 但主要表现在冬、夏两季; 区域平均年日照数在1980年附近存在突变现象。

关键词: 日照 气候变化 减少 突变

Tan Youbang and Xie Lijuan. 1996. The statistical characteristics for sunshine in the recent 40 years in Neijiang, Sichuan Province. Meteorological Monthly 22(10):27-30.

The changing characteristics of sunshine from 1960 to 1995 in Neijiang are analyzed using the data of the monthly sunshine in Neijiang. The average hours of sunshine in the area is decreasing at the trend rate of -46.98 hours/10 years, and this tendency appears mainly in winter and summer. There were abrupt changes of amount of sunshine hours in the area around 1980.

Keywords: sunshine, climatic change, decrease, sudden change



谢庄, 曹鸿兴, 1996, 北京最高和最低气温的非对称变化, 气象学报, 54 (4): 501-507

运用1940年以来北京历年各个月平均气温资料, 对最高、最低气温的非对称特性进行了研究, 结论是: 1940年以来, 北京最低气温呈明显上升趋势, 而最高气温反而下降, 40年代北京的增温主要在白天, 而80年代则在夜间。

关键词: 北京 增温 非对称性

Xie Zhuang and Cao Hongxing. 1996. The asymmetric trend of change in maximum and minimum temperature in Beijing. Acta Meteorologica Sinica 54(4):501-507.

The asymmetric characteristic of the maximum and minimum temperature is studied using the data of mean temperature in Beijing since 1940. (1) Since the 1940s, the minimum temperature increases but the maximum temperature decreases in Beijing; and (2) the temperature increases mainly in the day time in the 1940s but in night time in the 1980s.

Keywords: Beijing, temperature increase, asymmetric character



章名立, 曾昭美, 季劲钧, 1996, 全球增暖过程中亚洲东部区域气候的特点, 地理学报, 51 (6): 518-526

采用Jones等人的100年全球陆地气温格点资料集, 分析亚洲东部 (70-

Zhang Mingli, Zeng Zhaomei, and Ji Jingjun. 1996. Characteristics of regional temperature in East Asia during global warming period. Acta Geographica Sinica 51(6):518-526.

The gridded temperature data from 1891-1990 over East Asia (70-140°E, 20-55°N) from Jones et al. was been analyzed. It found that the temperature variations within the region were

140°E, 20—55°N) 的气温时空变化。发现100年来在全球增暖的过程中, 该区的气温变化有明显的区域特色。主要特点为冬季变暖、夏季略变冷。高纬度增温明显, 中国的东部和中亚细亚到新疆一带降温, 导致这种变化的原因可能与控制因子不同有关, 高纬度的变化与温室气体的增加有较大的关系, 而副热带纬度的变化可能与副热带大型的环流有关。

关键词: 区域气候

全球增暖与东亚气候 温室效应

季风区 温度距平

quite different from global average characteristics. Distinguishing regional features and seasonal variations are as follows: (1) The main warming appeared in winter, and there was no evidence of temperature increasing in summer. (2) There were significant differences between different latitude zones. Temperature increased both in winter and summer seasons at lower latitudes and slightly decreased in the subtropical areas. In higher latitude areas, temperature increased in winter and decreased in summer.

Keywords: regional climate, global warming and climate in East Asia, greenhouse effect, monsoon region, temperature anomaly



曾昭美,

章名立, 1996, 本世纪海洋云量变化与全球增暖问题,

大气科学, 20 (2): 149-158

Zeng Zhaomei and Zhang Mingli. 1996.

Variation of ocean cloud amount in the 20th century and global warming. Scientia Atmosphere Sinica 20(2):149-158.

本文分析了1890-

1990年间全球海洋总云量。为消除资料中非气候因素的影响, 序列被分为3个时段进行讨论。发现本世纪内与气候增暖的同时全球海洋云量有明显的增加, 但云量变化落后于全球平均气温变化1-

4年, 落后于全球平均海温1-

2年, 且云与温度变化的关系在不同气候带不同, 这可能是不同气候带上主要云型不同, 以致产生的辐射强迫效应不同。

关键词: 全球增暖 海洋云量

海面温度

Historical data of total cloud amounts over the global oceans during 1890-1990 are analyzed. The amount of cloud over the global oceans has increased in company with global warming since the end of the 19th century. The growing warming of the climate and the general circulation systems has influenced the variation of cloudiness. The variation of cloud amounts lagged behind global mean air temperature about 1 to 4 years, but lagged behind the sea surface temperature about 1 to 2 years. The correlation between cloud and temperature has opposite signs in different climate zones, mainly as a result of the difference of dominant cloud types in different climate zones.

Keywords: global warming, ocean cloud amounts, sea surface temperature

张光智, 张先恭, 魏凤英, 1996, 近百年西北太平洋热带气旋年频数的变化特征, 热带气象学报, 11(4): 317-323

利用1884-1988年西北太平洋热带气旋年频数资料, 分析了热带气旋年频数的多年变化及其与海面温度、南方涛动指数、太阳黑子数和环流型日数等的统计关系。初步结果表明, 热带气旋年频数的变化具有明显的21年、31年、15年和6年左右的周期和持续期平均为12年左右的阶段变化; 近百年来有三次较明显的转折, 分别出现在1931、1959和1977年。热带气旋年频数在厄尔尼诺年有冬春季偏少、夏秋季偏多的趋势, 但在统计上不够显著。在平流层西风位相时, 北半球纬向环流的异常发展及太阳活动的增强有助于热带气旋的生成和发展。
关键词: 热带气旋 厄尔尼诺 环境变化

Zhang Guangzhi, Zhang Xiangong, and Wei Fengying. 1996. A study on the variations of annual frequency for tropical cyclones in the Northwest Pacific during the last hundred years. *Journal of Tropical Meteorology* 11(4):317-323.

A study on the variation of annual frequency of tropical cyclone (TC) and its relation with sea surface temperature (SST), Southern Oscillation Index, sunspot relative number, and number of days for specific circulation patterns was made using 1884-1988 data of annual frequency for Northwest Pacific TC occurrence. Preliminary results indicate that there are obvious variations in annual TC frequency for periods of 21, 31, 15, and 6 years and sustaining periods of 12 years on average. Three well-defined processes of inflexion were observed in 1931, 1959 and 1977 over the past hundred years. Results also suggest an insignificant statistical tendency of annual TC frequency decreasing (increasing) in winter/spring (summer/autumn) in the El Niño years. When the stratosphere was in a zonally westerly phase, the Northern zonal circulation would abnormally develop and solar activity would enhance the generation and development of TC.

Keywords: tropical cyclone, El Niño, environmental change



张培忠, 杨素兰, 1996, 阻塞高压活动的气候变化及其中国某些地区旱涝的影响, 气象学报, 54(5): 633-640

本文利用1965年到1990年逐日500hPa天气图, 分析了北半球阻塞高压的活动特征。结果表明, 北半球有两大范围阻塞高压活动区; 从1965年至1990年阻高总次数有减少趋势; 暖年阻高次数比平均偏少, 冷年偏多, 且在地理分布上有

Zhang Peizhong and Yang Sulan. 1996. The climate change impact of blocking highs and their effects on drought and flood of some regions of China. *Acta Meteorologica Sinica* 54(5):633-640.

The climate change impact of blocking highs is investigated using the daily 500 hPa historical synoptic charts from 1965 to 1990. It found that there were two active regions of blocking highs in the Northern Hemisphere. The number of blocking highs had a decreasing trend from 1965 to 1990. The frequency of blocking highs decreased when the temperature was higher than normal and increased in the cold year. The regional distribution of blocking highs for the two typical years has an obviously inverse

很好的相关性;厄尔尼诺年乌拉尔山地区阻高较常年显著偏少。此外,本文还分析了阻高对中国某些地区旱涝的影响,发现内蒙古地区和江淮流域的旱年和多雨年,东半球阻塞高压和数量分布都呈反趋势。

关键词:阻塞高压 气候变化

旱涝

relationship. At the Ural Mountains, there was a large negative anomaly center for the El Niño Southern Oscillation (ENSO) year. Additionally, the effects of blocking highs on drought and flood of some regions of China are analyzed. An inverse distribution of blocking highs was found in the drought years and flood years of the Inner Mongolia Autonomous Region. The same relationship was discovered for the Changjiang River and Huaihe Valley.

Keywords: blocking high, climate change, drought and flood



周亚军, 朱正义, 1996,
近百年全球海温演变特征, 热带气象
学报, 12(1):85-90

Zhou Yajun and Zhu Zhengyi. 1996. Evolving
features of global SST over the past hundred
years. Journal of Tropical Meteorology
12(1):85-90.

通过对全球各大洋季海温距平的分析,
发现全球近百年海温变化有4大特点。
(1)从1860年至1930年,
全球各大洋海温为负距平,
其最大降温出现在1900年至1910年
之间,其值约为-
0.4℃。(2)本世纪10年代到60年代温
度开始回升,且40年代升温普遍强于
60年代。(3)70年代内本世纪第二次
明显降温,但其强度不如本世纪初那
次大,且持续时间也短,直到目前,海
温仍在不断持续上升。(4)各大洋海
温在数十年时间尺度中表明出了非
常好的同步性。

关键词:全球 近百年海温
演变特征

Analyses of seasonal anomalies of sea surface
temperatures (SST) for the oceans across the
globe revealed four major features of variation
over the past hundred years. First, the period from
1860 to 1930 was marked by almost monotonous
negative anomalies of SST, with the maximum
temperature drop (-0.4℃) taking place in 1900-
1910. Second, SST rose during the period from
the 1910s to the 1960s, and the amplitude of the
temperature rise was generally larger in the 1940s
than that in the 1960s. Third, the second
significant SST falling in this century occurred in
the 1970s with weaker intensity and shorter
duration than that in the first. Up to now, the
global SST has been generally in a stage of
persistent rise. Fourth, in a global range, the SST
for all of the oceans performed perfect
simultaneity at the scales of dozens of years.

Keywords: globe, past hundred years SST,
evolving features

周陆生, 汪青春, 1996,
青海湖水位年际变化规律的分析
和预测, 高原气象, 15(4):478-484

利用青海湖沙陀寺水文站1959-1992年的水位资料, 分析了前期气候类型、北太平洋海温、厄尔尼诺事件以及北极海冰对湖水位年际变化的影响, 得到了一些有预报价值的因子, 并采用贝叶斯逐步判别法对次年水位变化的3种状态进行了预测。

关键词: 水位年际变化 气候类型
北太平洋海温 北极海冰

Zhou Lusheng and Wang Qingchun. 1996.
Analysis and forecast for interannual variation of the Qinghai Lake's water level. Plateau Meteorology 15(4):478-484.

The influence of antecedent climatic type, sea surface temperature (SST) of the North Pacific Ocean, Arctic sea ice, and El Niño on the interannual variation of the Qinghai Lake's water level are analyzed on the basis of Shatuoqi hydrologic station's data from 1959 to 1992. The results are to be used to forecast the three states for next year's water level variation using Bayers successive discrimination method.

Keywords: water level interannual variation, climatic type, SST of North Pacific Ocean, Arctic sea ice



张寅生, 姚檀栋,
蒲健辰, 1996, 唐古拉山冬克玛底
冰川平衡线高度附近的能量平衡,
冰川冻土, 18(1): 10-19

本文以连续的、至少一年的观测资料对青藏高原唐古拉山冬克玛底冰川平衡线高度附近的辐射平衡及能量交换特征进行了计算分析。冰川表面独特的下垫面性质使其净辐射值全年有5个月左右为负; 潜热交换量基本与净辐射成反向的季节变化; 感热交换全年均为正值而成为该冰川表面主要热源之一; 传导热交换量对能量平衡的贡献很小。该冰川表面的能量交换水平季节变化明显, 冰川表面气温季节变化与净辐射关系密切。冰川表面气温对总辐射通量变化的敏感性系数与其反射率及吸收辐射通量关系密切。

关键词: 冬克玛底冰川 辐射平衡
能量交换

Zhang Yinsheng, Yao Tandong, and Pu Jianchen. 1996. Energy budget at the equilibrium line altitude (ELA) of Dongkemadi Glacier in the Tonggula Mountains, Tibetan Plateau. Journal of Glaciology and Geocryology 18(1):10-19.

The solar radiation budget and energy balance were analyzed based on a long time series observation in an automatic station set on the equilibrium line altitude (ELA) of Dongkemadi Glacier. At the observation point, the annual mean air temperature is -9.8°C , the annual mean air vapor pressure is 2.6 hpa, and the annual wind speed is 4.3 m/s. The annual amount of global radiation that reaches the surface of the glacier is about 7300 MJ/m^2 , only 1/4 of which is absorbed by the glacier. The net radiation is positive from April to October but negative for the rest of the year. The latent heat flux has a seasonal variation in the opposite direction from net radiation. The conductive heat flux is insignificant in the energy budget on the glacier surface. Both the energy-exchanging level and the energy-exchanging coefficient are large in summer and winter. The sensitivity coefficient of air temperature above the glacier to variation of global radiation correlates well with albedo and absorbed radiation.

Keywords: Dongkemadi Glacier, radiation budget, energy exchange

叶佰生, 赖祖铭,

施雅风, 1996, 气候变化对天山伊犁河上游河川径流的影响, 冰川冻土, 18(1): 29-36

本文用水量平衡模型研究了气候变化对天山降雪比较丰富的伊犁河上游河川径流的影响。研究表明, 作为西北干旱区水资源主要形成区的山区, 由于气温较低和降水丰富, 未来气候变化对水资源量的影响将主要取决于降水量的变化, 气温升高的影响相对较小。气候的变暖, 一方面使径流的年内分配发生变化, 月径流峰值减小, 时间提前, 春季径流增加, 而其余季节径流减少, 其中夏季减少最多; 另一方面将使年径流量的变率增大, 这对水资源的利用极为不便。

关键词: 气候变化 高寒山区径流

李培基, 1996, 北极海冰与全球气候变化, 冰川冻土, 18(1): 72-80

海冰仅占大洋面积的7%, 然而它所引起的海气之间热量、动量和物质交换的改变却十分显著。最近有关北极海冰在全球气候系统中作用的研究发现, 北冰洋边缘海域大洋深水的形成与海冰发育有关。海冰冻融过程对盐度层结具有重要影响, 海冰变化可引起盐度突变层的再变和热盐环流的突然停止。热盐环流的变化与北大西洋海冰10年际变化相联系, 北大西洋气候的不稳定性与热盐环流变化密切相关。北极海冰-海洋-大气间耦合作用, 使北极海冰构成了北大西洋和全球气候反馈循环中的重要环节。

Ye Baisheng, Lai Zuming, and Shi Yafeng.

1996. The effect of climate change in the Yili River in the Tianshan Mountains. Journal of Glaciology and Geocryology 18(1):29-36.

The river runoff changes in the Yili River basin are estimated under various future climatic scenarios using the river runoff model based on water balance. The impact of future climatic warming on water resources will depend on changes in precipitation rather than on a rise in air temperature because of the low air temperature and rich precipitation in the mountains. The future climatic warming would change the distribution and lower the peak of runoff. The runoff peak would occur earlier. Spring runoff would increase with a corresponding decrease of runoff in other seasons, particularly in the summer. Considerable change in runoff would occur with climatic warming and variational differences of runoff would increase with the shrinking of glacier area, and this would be unfavorable for the utilization of water resources.

Keywords: climate change, cold mountain region, runoff



Li Peiji. 1996. The Arctic sea ice and climate change. Journal of Glaciology and Geocryology 18(1):72-80.

Sea ice in the Arctic ocean, which covers large areas, and its transport into the North Atlantic represents a freshwater flux comparable to that of continental runoff and affects salinity stratification through brine rejection during freezing, transport, and melting. Salinity stratification is critical to the vertical circulation of the high-latitude ocean. Variation in sea ice may cause a great salinity anomaly or halocline catastrophe that can alter or stop convection. Evidence suggests that climate variations from decadal to millennial time scales are linked to the sea ice interaction with the thermohaline. This strong coupling between the Arctic sea ice, ocean, and atmosphere implies that variations in sea ice are involved in high-latitude and global climate feedback processes.

Keywords: Arctic sea ice, North Atlantic Deep Water (NADW), thermohaline circulation, climate variability

关键词：北极海冰 北大西洋深水
热盐环流 气候变化性



丁永建, 1996,
1980年以来冰冻圈对气候变暖响应的
若干证据,
冰川冻土, 18 (2) : 131-139

在最近几十年内, 全球气候在波动中
趋于变暖, 冰冻圈作为气候的直接产
物对气候变化具有非常敏感的反应。
山岳冰川物质平衡80年代较 60-70
年代平均减少近173mm, 相当于冰
川敏感值升高约0.38℃, 对气候变化
反映敏感的小冰川 (长度小于
2Km) 退缩比例增加了15%—20%;
冻土层中温度亦显示出强劲增势, 冻
土融深、冻土界限的变化已有所表现
。半球年平均雪盖面积80年代比70年
代减小约4%。种种迹象表明这种变
化进入80年代以来更为明显, 冰冻圈
内正发生着显著的变化。

关键词：冰川物质平衡 冰川变化
冻土温度 雪盖面积 冰冻圈
全球变暖

Ding Yongjian. 1996. Response of the cryosphere
to climatic warming since 1980 in the Northern
Hemisphere. *Journal of Glaciology and
Geocryology* 18(2):131-139.

In the recent decades, especially after 1980, global
warming has become more and more obvious.
The cryospherical system of glaciers, snow cover,
and permafrost is clearly reacting to the warming
climate. Glacier mass balance shows an
accelerating negative tendency within the main
glacier regions of the Northern Hemisphere. The
average mass balance in the 1980s in the Northern
Hemisphere was reduced by 1.3 times compared
with that in the 1960s and 1970s corresponding to
a rise of 0.38℃ in air temperature. The retreating
number of small glaciers (less than 2 km in
length), which appears to be very sensitive to
climate change, has increased 15% to 20% in the
1980s compared with the numbers in the 1960s
and 1970s. Permafrost temperature also shows a
significant increase. The permafrost table and the
altitude of the permafrost lower limit in the
northeast region of China are changing with
climate warming. Average area of snow cover in
the Northern Hemisphere was reduced by
approximately 1 million km² for the 1980s
compared with the 1970s which equals a decrease
of 4% in area of snow cover. Various indications
show that the cryospherical system has changed
with global warming.

Keywords: glacier mass balance, glacier variation,
permafrost temperature, snow cover, cryosphere,
global warming

杨新元,

韩添丁, 1996, 乌鲁木齐河源气温和降水的变化趋势及其对冰川影响, 冰川冻土, 18 (2): 189-193

乌鲁木齐河径流来源主要为降水、高山积雪、冰川融水及地下水。近30年来由于夏季气温的回升及降水量减少导致了冰川减薄。本文以大西沟气象站的气温、降水资料及1号冰川物质平衡观测值为主进行趋势计算, 从中了解60年代初至90年代初的变化规律及气温、降水对冰川的影响。乌鲁木齐河上游冰川区域夏季(6-

8月) 平均气温回升了 0.14°C ; 而6-8月降水总量减少了24mm, 7-

8月降水总量减少19mm, 年降水量减少17mm; 近30年来1号冰川平均每年减薄140mm水层, 90年代初冰川减薄厚度平均每年达181mm水层。根据趋势分析, 冰川厚度减薄仍在增大。

关键词: 温度 降水 径流 消融

Yang Xinyuan and Han Tianding. 1996. The variation trends of temperature and precipitation and their influence on glaciers in the headwaters of the Urumqi River. *Journal of Glaciology and Geocryology* 18(2):189-193.

The runoff in the Urumqi River mainly depends on precipitation and snow and ice meltwater. Because of the summer warming and precipitation reduction during the last 30 years, the glaciers are thinning. This article discusses the influence of temperature and precipitation on glaciers. Precipitation has decreased 19 mm (July-August) or 24 mm (June-August), and the mean summer (June-August) temperature has increased 0.14°C in the glaciated region in the Urumqi River from the beginning of the 1960s to the beginning of the 1990s. The annual precipitation has decreased 17 mm. Glacier No. 1 has thinned 140 mm per year in the nearly 30 years. A thinning rate of 181 mm per year was measured from 1991 to 1993. It is expected that the thinning rate will increase.

Keywords: temperature, precipitation, runoff, melting



方小敏, 陈富斌, 施雅风,

李吉均, 1996, 甘孜黄土与青藏高原原冰冻圈演化, 冰川冻土, 18 (3): 193-200

青藏高原的隆起对亚洲季风乃至全球变化有着明显的影响。青藏高原何时进入冰冻圈和高原上最大冰期发生于何时是冰川学和全球变化研究中两个非常关键的问题。逐样系统交变退磁磁性测量表明: 86m的甘孜黄土剖面形成于约 $81.84 \times 10^4\text{a}$ BP 前。

Fang Xiaomin, Chen Fubin, Shi Yafeng, and Li Jijun. 1996. Garze loess and the evolution of the cryosphere on the Tibetan Plateau. *Journal of Glaciology and Geocryology* 18(3):193-200.

The uplift of the Tibetan Plateau has great influence on the Asian monsoon and global change. The loess section in the Tibetan Plateau is the result of the uplift of the plateau. Magnetic polarity dating of an 86-m loess section at Garze on the southeastern Tibetan Plateau demonstrates that the bottom of the section was formed 818.4 ka BP. Analysis of various quartz sands in the section indicates that the plateau uplifted above the snow line and began to develop glaciers at least 818.4 a BP ago. Soon afterward (ca. 760 ka BP), glaciers reached their maximum, and may have

剖面中黄土石英砂类型分析揭示出至少约 81.84×10^4 a BP前冰川规模达到最大,并持续至约 53×10^4 a BP前。倒数第二次冰期时冰川规模次之,然后冰川规模明显减少。同时揭示出大气环流和环境在约 81.84×10^4 , 60×10^4 和 17.8×10^4 a BP前发生过较明显的改变或调整与增强,它们是青藏高原隆起阶段性环境突变效应的产物。

关键词: 甘孜黄土 青藏高原
形成年代 最大冰期

陈建明, 刘潮海,

金明燮, 1996, 重复航空摄影测量方法在乌鲁木齐河流域冰川变化监测中的应用, 冰川冻土, 18(4): 331-336

本文介绍了重复航空摄影测量对比成图方法在监测乌鲁木齐河流域冰川规模和形态要素变化中的应用,以及成图过程中对控制加密和精度等问题的处理。检验表明,重复航空摄影测量对比成图方法能较准确地测量冰川长度、面积和储量等形态要素的变化量,可以用于区域冰川变化的监测研究。测量资料表明,1964-1992年间,乌鲁木齐河流域155条冰川的规模均在缩小,冰川末端平均后退率为12.4%,面积平均缩小率为13.8%,冰储量减少15.5%。

关键词: 航空摄影测量 对比成图
冰川变化

persisted to about 530 ka BP. The second largest glaciation developed during the penultimate. Since the penultimate, the scale of glaciers has decreased greatly. The analysis also suggests that air circulation and the environment experienced sharp changes or adjustments and enhancement at about 818.4 ka BP, 655 ka BP, and 175 ka BP. These changes in air circulation and environment might be the results of accompanying environmental abrupt changes at some critical heights of the plateau with the sudden uplift.

Keywords: Garze loess, Tibetan Plateau, dating, Quaternary maximum glaciation



Chen Jianming, Liu Chaohai, and Jin Mingxie. 1996. Application of repeated aerial photogrammetry to monitoring glacier variation in the drainage area of the Urumqi River. Journal of Glaciology and Geocryology 18(4):331-336.

This article introduces the application of a comparative method that uses repeated aerial photogrammetric mapping to monitor the variation of glacier size and morphologic factors in the drainage area of the Urumqi River. The article also discusses the management control and accuracy of the method. The detection shows that the method with higher accuracy can be used to determine the variation of morphologic factors of glacier variation. The measurement data show that 155 glaciers in the drainage area of the Urumqi River all retreated from 1964 to 1992, with an average retreating rate of the glacier terminus of 12.4% and an average reducing rate of the glacier area of 13.8% as well as a loss of 15.5% of ice storage.

Keywords: aerial photogrammetry, comparative mapping, glacier variation

章新平,

姚檀栋, 1996, 青藏高原东北地区
现代降水中 δD 与 $\delta^{18}O$ 的关系研究,
冰川冻土, 18(4): 360-365

本文通过对取自青藏高原东北地区
部分降水样中的氢氧稳定同位素比
率的分析得到以下结论: 沱沱河站
的大气水线(MWL)为: $\delta D=8.25\delta^{18}O+9.22\%$,

与全球平均MWL的差别较小; 德令
哈、西宁站的MWL分别为: $\delta D=5.8$
 $6\delta^{18}O-27.28\%$ 和 $\delta D=6.96\delta^{18}O-$

30.19% , 均与全球平均MWL差别较
大。这主要归因于水汽源地的非平
衡蒸发和凝结物在非饱和大气中降
落时的非平衡蒸发。上述地区的过
量氘 $Ex\ d (= \delta D -$

$8\delta^{18}O)$ 具有较大的波动范围, 并且
与 δD 存在显著的正相关关系。这说
明过量的氘在很大程度上受非平衡
蒸发过程中氘分流速度率的制约。
分析表明, 青藏高原东北地区的暖
季, 来自海洋的水汽具有较低的稳
定同位素比率和过量氘; 来自本地
区蒸发的水汽具有较高的稳定同位
素比率和过量氘。

关键词: 青藏高原

稳定同位素比率

过量氘 大气水线

Zhang Xinping and Yao Tandong. 1996.

Relationship between δD and $\delta^{18}O$ in precipitation
at present in the northeast Tibetan Plateau. Journal
of Glaciology and Geocryology 18(4):360-365.

The application and understanding of stable
isotopic ratio in ice core has become very
important today. The meteoric water line (MWL)
of Tuotuohe Station is obtained as $\delta D = 8.25\delta^{18}O$
 $+ 9.22\%$ according to the analysis of the samples
from some regions of the northeast Tibetan
Plateau. This result is similar to that of the globe.
But the results of MWL of Delingha and Xining
Stations, which are $\delta D = 5.86\delta^{18}O - 27.28\%$ and
 $\delta D = 6.96\delta^{18}O - 30.19\%$, respectively, are different
from that of the globe. Excess deuterium ($Ex\ d$)
in the regions mentioned above has great
fluctuation, and there is a positive relationship
between $Ex\ d$ and δD . Analyses show that in the
northeast Tibetan Plateau the vapor from oceans
has a low stable isotopic ratio and $Ex\ d$ and the
vapor from the evaporation in the Plateau has a
high ratio and $Ex\ d$.

Keywords: Tibetan Plateau, stable isotopic ratio,
excess deuterium, meteoric water line



靳鹤龄, 董光荣, 李森等, 1996,

800Ka BP 来西藏“一江两河”

中游地区的气候与西南季风变化, 中
国沙漠, 16(1): 9-12

位于青藏高原温带半干旱季风气候
区的“一江两河”中游地区发现了
较多含古土壤的黄土地层,

Jin Heling, Dong Guangrong, Li Sen, et al.

1996. The climate and southwest monsoon change
in the middle “One River Two Tributaries” Basin,
Tibet, since 0.8 ma BP. Journal of Desert Research
16(1): 9-12.

This paper discusses the climate and southwest
monsoon change in the temperate and semi-arid
monsoon areas in the middle Yarlung Zangbo
River Basin in Tibet which is usually called “One
River Two Tributaries.” The study indicates that

记录着丰富的气候和西南季风演变信息。该地区风成地层沉积时代、沉积相和磁化率等研究结果表明,早在 800Ka BP

前西南季风就已存在,受全球气候波动和青藏高原隆起的影响,其盛行衰变与东南季具有较好的一致性,主要表现为本区地层所记录的气候变化信息不如东南季风区详细,而且西南季风因高原屏障作用给本区带来的降水愈来愈少,气候明显向干冷发展。

关键词: 青藏高原 风成堆积
季风变化

the southwest monsoon circulation had existed since before 0.80 ma BP, and that climate change in this area coincides with that in eastern China, but with differences between them. It shows mainly that the climate had been becoming cold-dry in this area since 518 ka BP as a result of glacial/interglacial climatic fluctuations and Qinghai-Xizang Plateau uplift.

Keywords: Qinghai-Xizang Plateau, aeolian deposition, monsoon change



马继瑞, 田素珍, 郑文振, 1996, 太平洋水位站相对海平面升降趋势分析, 海洋学报, 18(5):14-21

根据太平洋236个站月平均水位周期成分的分析结果,用周期成分加线性趋势拟合月平均水位序列。结果表明,若不计海平面的异常升降值,太平洋相对海平面平均上升率为1.16mm/a。由于陆地沉降不一致等影响,使太平洋相对海平面的升降区域性变化较大。按线性趋势项的正负及海区的地理位置,对包括中国近海、东南亚近海在内的太平洋海平面的升降进行了区划,求出各海区的平均升降率,得到整个太平洋、北美西海岸、南美北部和中部近海、热带太平洋大部及日本群岛近海相对海平面的升降趋势与有关文献的结果基本一致。

关键词: 太平洋 海平面 非线性
二阶谱 谱分析 周期成分
线性趋势

Ma Jirui, Tian Suzhen, and Zheng Wenzhen. 1996. The analysis of sea level variations in the Pacific Ocean. Acta Oceanologica Sinica 18(5):14-21.

According to the analysis of period components in the monthly mean sea level variation from 236 tide gauge stations in the Pacific, a monthly mean sea level series is fit by using significant period components plus the linear trend. The results of the linear trend show that if the abnormal rise of sea level isn't considered, the rate of relative sea level rise in the Pacific is 1.16 mm/year. Because of inconsistent earth subsidence, the regional difference of sea level variations in the Pacific is notable. Sea level variation of various oceans in the Pacific is assigned zones according value of linear trend and geographical position. The average rates of sea level variations in various oceans are obtained, and the results are consistent with historical records.

Keywords: Pacific Ocean, sea level, nonlinear, bispectrum, spectral analysis, period components, linear trend

East Asia Monsoon

施能, 朱乾根, 吴彬贵, 1996,
近40年东亚夏季风及我国大尺度天气
气候异常, 大气科学,
20 (5): 575-583

用近40年资料研究了东亚夏季风与我国夏季大尺度天气的关系。指出, 强夏季风时, 我国夏季大范围高温。东亚夏季风与我国夏季降水的关系则表现在夏季雨带的南北位置上。强夏季风时, 雨带偏北。夏季雨带偏南均与弱季风有关。长江中下游的涝年与弱季风有关, 而强夏季风时, 长江中下游经常是旱年。最后, 研究了强、弱夏季风年时的北半球500hPa环流异常特征, 结果表明, 东亚夏季风强度是造成我国夏季气温、降水异常的主要原因。

关键词: 东亚夏季风 强度指数
雨带 长江中下游

Shi Ning, Zhu Qiangen, and Wu Bingui. 1996.
The East Asian summer monsoon in relation to summer large-scale weather climate anomaly in China for the last 40 years. *Scientia Atmospherica Sinica* 20(5):575-583.

The relation of the East Asian summer monsoon (EASM) to the rainfall and temperature over China is investigated using data from the past 40 years. The investigation shows that when a strong monsoon occurs, China experiences an extensive high temperature in summer. The EASM effect on summer rainfall in the mainland is displayed in the meridional position of the rainbelt. The position of the summer belt moves northward (southward) from its mean position when the summer monsoon is strong (weak). Flooding (drought) years over the middle and lower reaches of the Changjiang River are related to the weak (strong) monsoon. Finally, the northern 500-hPa summer circulation feature for the years of the strong and weak EASM are examined and the results indicate that the EASM intensity represents a main factor for the temperature and rainfall anomalies over China in summer.

Keywords: East Asian summer monsoon, intensity index, rain belt, middle and lower reaches of the Changjiang River



庞奖励, 黄春长, 1996, 黄土高原晚更新世黄土与古季风研究进展, 干旱区地理, 19(2): 1-8

作者综合评述了近十年来中外学术界在黄土高原晚新世黄土与古东亚季风演变规律相互联系上的研究进展。

关键词: 黄土 晚更新世 东亚季风 黄土高原

Pang Jiangli and Huang Cunchang. 1996.
Progress in the studies of the loess and the evolution of the East Asian Monsoon on the Loess Plateau during the late Pleistocene. *Arid Land Geography* 19(2):1-8.

Loess stratigraphy has been shown to bear a variety of information on past global change. The loess-paleosol sequence is a well-preserved materialized record of the glacial-interglacial cycles, which is now confirmed by various proxy climatic indices obtained from many loess profiles on the Loess Plateau of China. In this paper, progress in the studies of loess and the evolution of the East Asian Monsoon on the Loess Plateau during the late Pleistocene are reviewed.

Keywords: loess, late Pleistocene, the East Asian Monsoon, loess plateau

熊尚发, 刘东生, 丁仲礼, 1996, 东亚冬、夏季季风变化的相位差及热带太平洋在季风变化中的驱动作用, 第四纪研究, (3): 202-210

对北京斋堂黄土剖面进行高分辨率古气候研究。结果显示: 1) 冬、夏季风在千年尺度上的变化存在相位差; 2) 冬夏季风记录在变化趋势上具有互为消长的关系, 而在变化幅度和频率方面则有明显的差异。这表明, 冬、夏季风在千年尺度的变化是分别由不同的因素和过程所控制。

关键词: 黄土 古季风 相位
热带太平洋

Xiong Shangfa, Liu Dongsheng, and Ding Zhongli. 1996. Phase difference between summer and winter paleomonsoon variations over East Asia and the tropical Pacific forcing of monsoon evolution. *Quaternary Sciences* (3):202-210.

Results from analysis of a high-resolution paleoclimatic record of the Zhaitang loess sequence in Beijing reveal: (1) An apparent phase difference of the summer and winter monsoon change and (2) that differences of the summer and winter monsoon change are distinguishable in some aspects, and summer and winter monsoon variations are not always matched to each other. These scenarios indicate that summer and winter monsoons over East Asia are not dominated by the same factors and mechanisms.

Keywords: loess, paleomonsoon, phase, tropical Pacific



Historical Climate Change

刘洪滨, 吴祥定, 邵雪梅, 1996, 采用树轮图象分析方法以研究历史时期气候变化的可行性, 地理研究, 15(2): 44-51

采用图象分析方法, 对中国四川省西部采集到的川西云杉进行气候变化研究的可行性分析, 同时与其它方法得到的结果进行对比。对比分析表明, 图象分析得到的年轮宽度序列与宽度仪的测量结果基本相同; 而年轮宽度与年轮灰度序列之间不存在明显关系, 其差异可能是不同环境因子作用的结果。图象分析得到的川西云杉年轮灰度年表在反映某些气候要素变化上优于年轮宽度年表, 并以年轮最小灰度, 年轮平均灰度和晚材平均灰度尤为突出。川西云杉年轮灰度主要受初春月平均最高气温的影响, 且两者为负相关关系。

Liu Hongbin, Wu Xiangding, and Shao Xuemei. 1996. A preliminary study on climate change research during historical time using image analysis of tree rings in the Kangding area, Sichuan Province. *Geographica Research* 15(2):44-51.

The possible use of tree-ring image analysis with *pinus balfouriana* sampled from West Sichuan Province in climate change research for historical time in the Kangding area is studied. There is almost no difference between the ring-width series derived from image analysis and from instrumental ring-width measurement, but the relationship between the series of gray value parameters is not as close as that of the series of ring-width parameters. Gray value chronologies from image analysis are superior to ring-width chronologies in indicating some climate factors, especially the minimum gray value, average gray value, and later wood gray value.

Keywords: climate change, tree ring, image analysis

关键词: 气候变化 川西
树木年轮 图象分析



莫多闻, 李非,

李水城, 1996, 甘肃葫芦河流域中全新世环境演化及其对人类的影响, 地理学报, 51(1): 59-69

利用甘肃葫芦河流域第一阶地剖面的地层观察资料, 对秦安大地湾附近第一阶地沉积剖面的沉积相、粘土矿物、碳酸钙、孢粉等古环境指标进行了分析, 恢复了该地区大约距今8000年至3000左右的环境演变过程。并对该地区古环境变化与人类活动规模及古文化特征变化之间的关系进行了讨论。

关键词: 葫芦河流域 中全新世
古环境演变 人类活动

Mo Duowen, Li Fei, and Li Shuicheng. 1996. A preliminary study of the Paleoenvironment of the Middle Holocene in the Hulu River area in Gansu Province and its effects on human activity. *Acta Geographica Sinica* 51(1):59-69.

The paleoenvironment is reconstructed by the analysis of proxy data from sedimentary characteristics, clay minerals, carbonates, and pollens in the deposits on the terrace near Dadiwan, Qinan. Also, the relationships of paleoenvironment change with size of communities and the characterization of ancient civilization are discussed. The results show that climate change played a big role in the development of ancient civilization in the region. Parallel to the appearance and development of the first stage of Dadiwan, the suitable climate from 8000 to 7000 a BP was important to the stable development of Yangshao civilization. After 5000 a BP, the climate was drier, which was suggested to be a major cause of the decreasing size of communities and the recessing of ancient civilization in this area.

Keywords: Hulu River area, middle Holocene, paleoenvironment evolution, human activity



苗丰民, 李淑媛,

庄振业, 1996, 辽东湾东部砂岸的近期变化及演变趋势, 海洋学报, 18(2): 75-84

根据鲅鱼圈观测站近30年(1963-1991年)的波浪资料, 结合水准测量以及若干简易标桩跟踪监视, 并借助地方志及不同时期地形图对比等资料, 讨论了区域沿岸泥沙演变特点。

Miao Fengmin, Li Shuyuan, and Zhuang Zhenye. 1996. Modern change and evolutionary tendency of the sand coast in the eastern area of Liaodong Gulf. *Acta Oceanologica Sinica* 18(2):75-84.

The present situation of the coastline and the causes of sand coastal recession and its serious consequences are analyzed using the wave data of a 27-year period (1963-1991) at the Bayyquan Observation station in Liaodong Gulf, together with monitoring by beach leveling and some simple marking stakes and by the aid of local

同时,采用沿岸输沙模式,一线蚀淤理论及动水型理论(海平面上升)对区域岸线的今后动态进行了预测。

关键词:辽东湾东部 砂岸
岸滩演变

annals. Then the dynamic processes of alongshore sand transport are discussed. Simultaneously, a preliminary estimate of future beach processes in the area is made on the basis of an alongshore sand transport model, one-line cut-and-fill theory, and a dynamic water model (sea-level rise).

Keywords: eastern area of Liaodong Gulf, sand coast, coastline evolution



聂宝符, 1996, 五千年来南海海平面变化的研究, 第四纪研究,

(1): 80-87

礁坪面是古海面的极好标志。通过分析大量古高海面礁的资料,证实了南海出现过至少比现今高2-3米的高海面。

关键词: 高海面 珊瑚礁 南海

Nie Baofu. 1996. Sea-level change of the South China Sea in the past 5000 years. Quaternary Sciences (1):80-87.

The reef flats are thought to be an indicator of sea-level change. It is proved that the high sea level that occurred in about 5000 a BP in the South China Sea was 2 to 3 m higher than the current sea level from a lot of data on the reef flats.

Keywords: high sea level, coral reef, the South China Sea



陶发祥, 洪业汤, 1996, 贵州草海地区最近8ka的气候变化, 科学通报, 41(16): 1489-1492

通过对泥炭纤维素 $\delta^{13}\text{C}$ 和 $\delta^{18}\text{O}$ 的测定, 本文研究了贵州草海地区最近8Ka的气候变化。过去8ka间, 草海地区发生了明显的冷暖和干湿变化, 该区泥炭档案记录了北半球冰后期的几次新冰期和中世纪温暖期等半球性气候事件, 这说明该区对全球变化是敏感的; 最近8ka, 草海地区气候表现了暖湿和冷干的特点。

关键词: 泥炭纤维素 碳氧同位素
气候变化

Tao Faxiang and Hong Yetang. 1996. Climatic change over the past 8000 years in the Caohai District, Guizhou. Chinese Science Bulletin 41(16):1489-1492.

Climatic change over the past 8000 years in Caohai, Guizhou is studied using the $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values of peat cellulose. The peat archives in the area have information that indicates the hemispheric climatic events, such as three new ice ages and the Medieval Warm Period that occurred in the Northern Hemisphere. These data indicate that the climate of Caohai might be sensitive to global environmental changes. Also, the authors believe that there was a typical variation of the warm-moist/cool-dry climate in Caohai during the past 8000 years.

Keywords: peat cellulose, carbon and oxygen isotope, climatic change

王承义,

胡扬斌, 1996, 新疆伊犁地区近250年冷暖变化特征分析, 干旱区地理, 19(3): 37-44

利用伊犁地区22个树轮年表, 重建了该地区250年平均温度序列, 并对其周期冷暖变化特征进行了分析, 对未来趋势作了预测。该地区250年中存在3个偏冷期和4个偏暖期, 温度序列具有166、83、11、2.2年较为稳定的变化周期, 平均温度变化目前正处于偏暖时期, 此后到2005年进入下降时期。

关键词: 冷暖变化特征 伊犁地区
树木年轮

Wang Chengyi and Hu Yangbin. 1996. Analysis of the characteristics of cold-warm climatic variation in the last 250 years of Yili, Xinjiang, China. *Arid Land Geography* 19(3):37-44.

The annual mean series of temperature at Yili, Xinjiang, China for the last 250 years is reconstructed using tree-ring data. Characteristics of warm/cold change are analyzed from this series. The results indicate that there were three cold periods and four warm periods by 166, 83, 11, and 2.2 years respectively.

Keywords: cold-warm climatic variation, Yili region, tree-ring



吴丰昌, 万国江,

黄荣贵, 1996, 贵州红枫湖纹理沉积物中近代气温记录, 地理科学, 16(4): 345-350

定量评估了红枫湖早期成岩化学作用对沉积物碳酸盐沉积记录的影响程度, 通过纹理年代学校正柱芯的碳酸盐地球化学剖面 and 近代流域气温资料对比研究, 表明碳酸盐总量和 $\text{Ca}/(\text{MgO} \cdot \text{Al}_2\text{O}_3)$ 比值可作为湖泊近代气温变化的敏感代用标志。

关键词: 纹理沉积物 气温记录
碳酸盐 地球化学 红枫湖

Wu Fengchang, Wan Guojiang, and Huang Ronggui. 1996. Recent temperature records of annually laminated sediments in Hongfeng Lake, Guizhou. *Acta Geographical Sinica* 16(4):345-350.

The influence of the early diagenesis process on lake sedimentary carbonate at Hongfeng Lake is analyzed through comparison of the carbonate geochemical profile in the core, calibrated to mass-depth from varve-counting dating, with recent annual temperature data. It found that carbonate concentration and the $\text{Ca}/\text{MgO} \cdot \text{Al}_2\text{O}_3$ ratio can be used as a high-resolution temperature index in recent lake sediments.

Keywords: annually laminated sediments, temperature records, carbonate, geochemistry, Hongfeng Lake

张志华,

吴祥定, 1996, 祁连山地区1310年以来湿润指数及其年际变幅的变化与突变分析, 第四纪研究,

(4): 368-378

为研究祁连山地区的气候变化与气候突变, 用树木年轮资料重建了祁连山地区5~7月份1310年以来的湿润指数序列 $M(i)$ 以及湿润指数年际变幅序列 $MV(i)$ 。对两个序列分别进行了等级分类和干湿、强弱的时段分析, 并用最大熵谱分析法对这两个序列的不同时段分别进行了周期分析, 显示祁连山地区湿润指数及其年际变幅有明显的周期性。采用HK突变检验方法对这两个序列分别进行了突变分析, 发现祁连山地区的湿润指数及其年际变幅存在明显的突变年份。

关键词: 湿润指数

湿润指数年际变幅 气候突变

Zhang Zhihua and Wu Xiangding. 1996. The change and rapid shifts of moisture index and its annual variability since A.D.1310 in the Qilianshan area. *Quaternary Sciences* (4):368-378.

In order to study climate change and abrupt change of climate, the moisture index (May to July) time series $M(i)$ since A.D. 1310, was obtained from tree-ring chronologies in the Qilianshan Mountains (38°51'N, 100°08'E, 3500 m). A time series of the annual moisture index variability $MV(i)$ was also made. The $M(i)$ and $MV(i)$ were classed into five grades and were analyzed using maximum entropy spectrum. Results indicate significant periodic climatic variation. Discontinuous changes of the $M(i)$ and $MV(i)$ are detected by the Lepage test, and results show that there was obvious abrupt change of moisture in the Qilianshan Mountains over the last 680 years.

Keywords: moisture index, annual moisture index variability, rapid climate shift



张青松, 李元芳, 杨惟理, 1996, 北极巴罗Elson泻湖过去450年气候与环境变化记录, 第四纪研究,

(3): 211-220

对北极巴罗地区Elson泻湖 AB-67站孔岩芯进行了 ^{210}Pb 测年、沉积物粒度、有机质、化学元素和微体古生物化石等分析。结果显示: 巴罗地区过去450的气候、环境变化过程存在如下3个阶段:

- 1) 1540-1740 年为低海面寒冷时期;
- 2) 1740-1827 年为气候转暖-海侵过渡时期;
- 3) 1827年至今为继续海侵-气候波动变暖时间。另外,

Zhang Qingsong, Li Yuanfang, and Yang Weili. 1996. Climatic and environmental change over the past 450 years recorded in Elson Lagoon at Barrow, Alaska. *Quaternary Sciences* (3):211-220.

An unfrozen 60-cm-deep lake deposit core (AB-67) from Elson Lagoon at Barrow, Alaska, is analyzed for ^{210}Pb , grain size, organic materials, environmental geochemical elements, microfossils, etc. The results show that three stages of climatic and environmental changes occurred in the Barrow area over the past 450 years: (1) From 1540 to A.D. 1740 was a relatively cold stage with a low sea level; (2) from 1740 to A.D. 1827 was a transitional stage of warming and transgression; and (3) after A.D. 1827 was a fluctuating warming stage followed by sea-level rising.

Keywords: Arctic, lagoon, climatic and environmental change

本研究还就若干海面变化事件和未来
气候变化趋势进行了讨论。

关键词：北极 泻湖

气候与环境变化



Impacts

徐文铎,

邹春静, 卜军, 1996, 全球变暖
对中国东北植被的影响及对策, 地理
科学, 16(1): 26-36

中国东北植被对全球变暖的响应如下：
：未来建群种的变动类型分为三个类
群；气候变暖后，植物种群将向北迁
移400~700km，向上迁移250~350m
；栽培作物的界线有所变化；大部分
植物物候发育将提前一个节律；主要
森林生态系统生产力将提高7.65%，
农业生态系统生产力将提高36.4%。

关键词：全球变暖 水热指标

Xu Wenduo, Zou Chunjiang, and Bu Jun. 1996.
The influence of global warming on vegetation in
northeast China and measures to be taken. *Scientia
Geographica Sinica* 16(1):26-36.

According to the prediction of general circulation
models (GCM) by the middle of the next century,
the concentration of CO₂ in the atmosphere will be
doubled and the global temperature will increase
about 2°C. The vegetation response to global
warming in northeast China will include the
following changes: (1) The future alternative types
of edificators (builders) can be divided into three
types (extending population; retreat population;
extinct population). (2) The edificators will move
northward about 400 to 700 km and the population
move upward 250 to 350 m. (3) The distribution
border of cultivated crops will move. (4) The
growth period of plants will extend 15 days and
the phenological development of trees will
roughly advance one season. (5) The productivity
of the main forest ecosystem will increase 7.65%
and that of main agroecosystems will increase
36.4%.

Keywords: global warming, moisture-temperature
indexes



王修兰, 1996,

全球农作物对大气CO₂及其倍增的吸
收量估算, 气象学报,
54(4): 466-473

根据农作物产量资料 (FAO, 1992年
), 计算出中国和全球各种农作物

Wang Xiulan. 1996. The estimation of crop
absorbing CO₂ under current and doubling CO₂
conditions in the World. *Acta Meteorologica
Sinica* 54(4):466-473.

The CO₂ absorption from crops has been
estimated on the basis of crop production data
(FAO, 1992). It is about 550 million tC/year in
China and 2890 million tC/year in the world.

对CO₂的吸收量分别为 5.5×10^8 t/aC和 28.9×10^8 t/aC。同时以不同CO₂浓度下小麦、玉米、大豆等全生育期光合速率实验数据直接计算的C吸收量为对照,与相应的中国产量资料计算结果比较,两者相差2.6%。从而进一步依据作物对CO₂倍增反应诊断实验结果,推算出大气CO₂浓度比目前倍增(700ppm)条件下,中国和全球农作物吸收CO₂总量将增长21%—26%,分别为 $6.6 \times 10^8 - 6.9 \times 10^8$ t/aC和 $34.1 \times 10^8 - 36.2 \times 10^8$ t/aC。研究还表明,单位面积作物年吸收C量全球 [$3.2 \text{ t}/(\text{hm}^2 \cdot \text{a})$] 比中国 [$4.2 \text{ t}/(\text{hm}^2 \cdot \text{a})$] 低25.4%,而且C₄作物普遍高于同类C₃作物。

关键词: 作物 CO₂倍增
CO₂吸收量 估算

Photosynthetic experimental data for wheat, corn, and soybean in all growing seasons can be used to calculate absorption of C directly, with a 2.6% error between estimation and calculation. Thereby, according to experimental results of crop response to a doubling CO₂, crops absorption of CO₂ will increase 21 to 26% under a doubling CO₂ concentration condition (700 ppm compared with 350 ppm). That is, the total CO₂ absorption from crops will be 660 to 690 million tc/year in China and 3410 to 3620 in global world. Additionally, this study indicates that crops absorb C at a rate of $4.2 \text{ t}/(\text{hm}^2 \cdot \text{a})$ in China, which is 25.4% more than the mean level of the world ($3.2 \text{ t}/\text{m}^2 \cdot \text{a}$), and that C₄ crop species take up more C than do C₃ crops generally.

Keywords: crop, CO₂ doubling, absorbing CO₂, estimation



李新, 1996, 塔里木盆地西北部荒漠化气候特征, 干旱区地理, 19(1): 53-57

利用中国科学院阿克苏水平衡试验站30余年的气象观测资料,分析了近年来荒漠化对气候的影响及气候与沙漠化的关系。主要结论如下: 1) 若人类不改变沙漠边缘的水文和植被状况,气候因子不会导致沙漠化; 2) 春季风沙和浮尘天气多,是土地沙漠化易发生的季节; 3) 塔克拉玛干沙漠北部绿洲以外的广大地区近来水文条件有所变劣,植被减少,气候条件对沙漠化有促进作用。

关键词: 塔里木盆地西北部
气候特征 荒漠化

Li Xin. 1996. Climate characteristics of desertification in the northwestern part of Terim Basin. Arid Land Geography 19(1):53-57.

The relationship and changing regularity between the climate and desertification in the northwestern part of Tarim Basin are discussed on the basis of climatic data collected at the Aksu Water Budget Experiment Station (AWBS) from 1962 to 1993. The conclusions are: (1) Desertification cannot be brought about by climatic factors if the hydrological and vegetation conditions are not changed by human activities. (2) Sand-drifting and dust-floating weather occurs frequently and desertification occurs easily in spring. (3) Hydrological and vegetational conditions become worse and the climate impels desertification around the oases in the northern part of Tarim Basin.

Keywords: Tarim Basin, climatic characteristic, desertification

王会昌, 1996, 2000年来中国北方游牧民族南迁与气候变化, 地理科学, 16 (3) : 274-279

探讨了近2000年来气候变化与北方游牧民族南迁的关系。认为, 气候变化与中国历史发展有着内在联系。在气候温暖期, 北方游牧民族与中原农耕王朝和平共处, 气候寒冷干旱时期, 北方游牧民族由于生存环境不适于生存而南迁, 中原的农耕世界受到冷期影响而国势衰微, 于是出现北方游牧民族统治农耕世界的王朝或二者对峙的局面。

关键词: 中国北方游牧民族
气候变化 南迁

Wang Huichang. 1996. The relationship between the southern migration of the nomadic nationalities in North China and climatic change. *Scientia Geographica Sinica* 16(3):274-279.

The corresponding relationship between the southern migration of nomadic nationalities in North China and climatic changes is studied. It is believed that there are relationships between climatic changes and Chinese historical development. In the warm period, the nomadic nationalities that dwelt north of the Great Wall lived together in peace with the agricultural nationality that dwelt in the Central Plains. However, in the cold period, the nomadic nationalities launched an all-out offensive on the agricultural world because the forage grass withered and the water source had dried up in the prairie. At the same time in the Central Plains, the agricultural world was also hit by the cold climate. Thus either the nomadic nationalities controlled the agriculture nationalities or they confronted each other.

Keywords: nomadic nationality in North China, climatic change, migrating south



白月明, 王春乙,
温民, 1996, 不同CO₂浓度处理对冬小麦的影响, 气象, 22(2): 7-11

利用OTC-1型开顶式气室, 进行不同的CO₂浓度处理对冬小麦发育影响的诊断试验。结果表明, 不同二氧化碳浓度, 冬小麦的发育期、生物量、叶面积、产量、产品质量、种子发芽率以及粘虫等有明显差异。

关键词: 开顶式气室
不同CO₂浓度处理 冬小麦

Bai Yueming, Wang Chunyi, and Wenmin. 1996. Impacts of different CO₂ concentration treatments on winter wheat. *Meteorological Monthly* 22(2):7-11.

A diagnostic experiment on the impacts of different CO₂ concentration treatments on the growth and development of winter wheat is made using open top chambers OTC-1. Results show that the impacts of different CO₂ concentration treatments on the development stage, biomass, leaf area, grain yield, grain quality, and armyworm infestation are remarkably different.

Keywords: open top chamber (OTC-1), different CO₂ concentration treatment, winter wheat

王修兰,

徐师华, 1996, 气候变暖对土壤化肥用量和肥效影响的实验研究, 气象, 22 (7): 12-16

分析气候变暖对土壤肥料施用量和肥效的影响, 并提出相应的对策。通过对土壤分期增施不同用量尿素的实验, 测定土壤中速效氮含量的动态变化, 研究土壤肥效对温度的反应。结果表明, 温度升高, 土壤中速效氮释放量增大, 释放速度加快, 释放周期缩短。在450—1125kg/ha施肥水平下, 每增温1°C氮释放平均增加4%, 释放周期缩短3.6天。同时, 施肥量愈大, 速效氮释放量也愈大, 释放速度愈快。因此, 在气候变暖的条件下, 需相应增加施肥总量和施肥次数, 减少每次施用量, 提高肥效, 减弱气候变暖对肥效的不利影响。

关键词: 气候变暖 化肥 肥效

吴金栋, 太华杰, 1996,

近30年我国气候变化的不稳定性及其与农业的关系, 气象, 22 (8):3-8

引入信息论中熵值分析方法, 利用全国七大区1961-1990年的气象和粮食生产资料, 统计分析近30年平均气温和降雨量等4个要素熵值变化的时间型和空间型。在此基础上, 讨论了气候变化的不稳定性与农业气象灾害的关系及其对农业产量的可能影响, 并得出产量与气象要素熵值的定量关系。

关键词: 气候变化 不稳定性

熵 农业

Wang Xiulan and Xu Shihua. 1996. The experimental study on the effects of climate warming on fertilizer amount and efficiency in the soil. Meteorological Monthly 22(7):12-16.

The changes of easily available nitrogen (N) content in the soil are measured and the responses of soil fertilizer efficiency to temperature are studied using a soil fertilizer experiment under three urea levels with different release rates. Results show that the release amount of N increases in the soil when temperature goes up, and the release rate shortens. When temperature increases 1°C, the release amount of N enhances 4% on the average and the release period shortens 3.6 days. In addition, the greater the fertilizer amount, the more the release amount of N is, and the quicker the release rate will be. Therefore, in conditions of climate warming, the total of fertilizer amount and frequency should be increased relatively, but the amount each time should be decreased, thereby enhancing fertilizer efficiency, and reducing the disadvantageous impact of climate warming on fertilizer efficiency.

Keywords: climate warming, fertilizer, fertilizer efficiency



Wu Jindong and Tai Huajie. 1996. The variability of climate change and its relationship to agricultural production in China during the last 30 years. Meteorological Monthly 22(8):3-8.

Based on the data of meteorology and crop yield in seven regions of China from 1961 to 1990, the method of entropy analysis in information theory is applied to discussion of the temporal and spatial distribution patterns of entropy change of four meteorological factors (mean temperature, maximum temperature, minimum temperature, and rainfall) in the last 30 years. Regression models of yield and entropy of meteorological factors in different regions are established.

Keywords: climate change, variability, entropy, agriculture

马树庆, 1996, 气候变化对东北地区粮食产量的影响及适应性对策, 气象学报, 54 (4): 484-492

采用作物生长发育和产量形成对气温、降水等资源环境条件的反映函数, 建立了在气候变化条件下粮食产量变率理论推算模式, 分析了在主要农作物生长季气温升降与降水增减的各种组合条件下, 东北各地粮豆作物产量的变化, 提出了适应气候变化的农业对策。

关键词: 气候变化 粮食产量
影响模式 农业对策 东北三省

Ma Shuqing. 1996. A simulating study on the influences of climate change on grain yield and the countermeasures in Northeast China. Acta Meteorologica Sinica 54(4):484-492.

Using the response function of the growth and yield of crops to temperature and precipitation, the calculating model of the variability of yield in various parts of northeast China is analyzed in association with variable combined conditions of temperature change and precipitation change. The agricultural countermeasures to the climate change are also put forward.

Keywords: climate change, grain yield, impact model, agricultural countermeasures, northeast China



张苏平, 胡桂芳,

朱平盛, 1996, 降水长期变化对胶东地区水资源的影响, 气象, 22 (11): 3-9

利用1960-

1994年胶东地区降水和水资源资料, 用变点分析方法将35年分成A、B两个气候段。分析发现从A段到B段降水, 水资源明显减少。水资源总量的变化规律和降水变化规律一致, 但前者的变化率明显大于后者。对2000年水资源分析表明, 水的利用率要提高30%以上方能基本满足经济发展的需要。

关键词: 降水长期变化 水资源
分析预测

Zhang Suping, Hu Guifang, and Zhu

Pingsheng. 1996. Impacts of precipitation change on water resources in the Jiaodong Region, Shandong Province. Meteorological Monthly 22(11):3-9.

Precipitation and water resources data for 35 years (1960-1994) in the Jiaodong region are divided into two periods by means of change-point analysis. Marked shifts between the two periods are revealed for both rainfall and water resources. The variation trends of precipitation and total amount of water resources are identical, but the former variation rate is smaller than the latter's. Supply-and-demand analysis for the year 2000 indicates that the utilization efficiency of water resources must be raised at least 30% in order to meet the needs of basic economic development.

Keywords: long-range variation of precipitation, water resources, analysis and prediction

高素华, 郭建平,

赵四强, 1996, “高温”对我国小麦生长发育及产量的影响, 大气科学, 20(5): 599-605

采用田间试验、人工模拟试验和历史资料分析模拟及CERES小麦模式相结合的方法研究温度变化对小麦生长发育及产量的影响。结果表明: 随温度升高, 小麦发育历期缩短, 高温使春小麦经济产量下降, 温度升高改善了冬小麦越冬条件, 对穗粒数及籽粒重有利。返青后的“高温”对冬小麦经济产量不利。

关键词: 小麦 生长发育 产量
“高温”影响

Gao Suhua, Guo Jianping, and Zhao Siqiang. 1991. The impacts of “higher-temperature” on wheat growth and yield in China. Scientia Atmospherica Sinica 20(5):599-605.

The impacts of “higher-temperature” on both winter wheat and spring wheat development stages, production structure, and economic yield are analysed using field experiments, artificial chamber simulation experiments, historic data, statistical analysis, and Crop Environmental Resource Synthesis (CERES) winter wheat models. The results show that the wheat development period shortens and the economic yield decreases as temperatures rise. The increase of temperature improves the overwinter condition for winter wheat which is favorable for ear grain numbers and grain yield. However, the “higher-temperature” after spring greening is unfavorable for winter wheat economic yield.

Keywords: wheat, development, production, “higher-temperature” impact



刘黎明, 陈创买, 1996, 广东近40年来5—9月气候变化及与主要农作物关系, 热带地理, 16(2): 136-144

用多元逐步回归分析方法探讨了广东全省性气候变化与同期及后期(1—3年)主要农作物单产量间的关系, 并作了预报。有如下结论: 5—9月各气候要素最重要的EOF分量空间分布相似, 都为全省位相相同的型式; 广东主要农作物(如稻谷、花生、糖蔗)的趋势产量都是二次非线性的, 而且其周期性变化特征不显著; 由4种不同方案选入气候因子来考虑单个气候因子及多种因子综合对作物产量的影响, 4种方案的结果有明显的差异; 气候因子在预报方程和拟合方程有很

Liu Liming and Chen Chuangmai. 1996. The change of the climate from May to September for the years 1954-1990 with relationship to the main crop yields in Guangdong Province. Tropical Geography 16(2):136-144.

Climate change and its relationship with the yields of three main crops in Guangdong Province are studied with multiple regression analysis. The first eigenvector of each variable describes the same phase change pattern. The trends of yields of three main crops are all nonlinear and have no periodic signals. The climate factors in the prediction equations are very different from those of the simultaneous equations, and the multiple correlation coefficients in the prediction equations of multiple regression analysis are even better than those in the simultaneous equations.

Keywords: climate change, crop yield, prediction, Guangdong Province

大的不同, 比较4种方程,
预报方程的最佳效果比同期拟合方
程的效果还好。

关键词: 气候变化 农作物产量
预报 广东省。



王石立, 娄秀荣, 1996,
气候变化对华北地区冬小麦水分亏
缺状况及生长的影响, 应用气象学
报, 7(3): 308-315

利用43个站点的多年气象资料、作
物发育期资料和土壤水文资料, 计
算了未来气候变化情景下华北冬小
麦生产区小麦不同发育阶段和全生
育期内水分亏缺量的变化。结果表
明, 气温升高时小麦水分亏缺状况
变差, 亏缺量等值线南移, 引起小
麦气候适宜区范围缩小, 减产额加
大, 产值降低, 用于额外灌溉的生
产费用增加。

关键词 气候变化影响 水分亏缺
冬小麦

Wang Shili and Lou Xiurong. 1996. Impacts of
climate change on the water deficit status and
growth of winter wheat in North China. *Quarterly
Journal of Applied Meteorology* 7(3):308-315.

The water deficits at various development stages
and during the whole growing season of winter
wheat in North China under different climate
change scenarios are calculated based on the
meteorological data, crop development period,
and soil hydrological data from 43 stations. The
results show that when temperature rises, the
water deficit status deteriorates, the isolines of
deficit might shift southward, and the climate-
suitable areas of wheat would contract. The yield
reduction would become serious, output values
would lose, and production costs resulting from
additional irrigation also might increase.

Keywords: climate change impacts, water deficit,
winter wheat



罗承平, 薛纪渝, 1996, 大气中CO₂
浓度增加对我国农业生产的影响,
热带地理16(3): 191-195

分析了全球大气中CO₂浓度上升对我
国农业生产的影响, 并提出了对策。
结果认为: 1) 由于光合作用的增强,
作物第一性生产力将增加; 2) 作
物水分利用效率增强; 3) 根、茎、
叶、花、果实和种子的生产发育加
快; 4) CO₂增加引起的全球

Luo Chengping and Xue Jiyu. 1996. Effects on
increase of CO₂ in the atmosphere on agricultural
production in China. *Tropical Geography*
16(3):191-195.

The effects of an increase of CO₂ in the
atmosphere on agricultural production in China
are predicted. (1) The primary productivity of
crops would rise because of a strengthening of
photosynthesis. (2) Crops would have a higher
rate of water-use under increased atmospheric
CO₂. (3) Roots, stems, leaves, flowers, fruits, and
seeds might experience enhanced growth. (4)
Global climate change, caused partly by the
increasing CO₂, would lead to a series of

气候变化将导致一系列农业生产条件如光、温度、水、土壤的改变,作物产出将受到影响。由于中国各地自然环境差异大,不同地区农业条件的变化有很大的不同。

关键词: CO₂ 农业生产 对策

transformations of agricultural productive conditions, such as changes in light, temperature, water, soil, and air. Thus, the output of crops would be influenced, but be greatly different in different areas. Some countermeasures for agricultural production in China are proposed.

Keywords: CO₂, agricultural production, countermeasures



郑有飞, 杨志敏, 1996,
作物对太阳紫外辐射增加的生物效应
及其评估, 应用生态学报,
7(1): 107-109

分析UV-A和UV-B

辐射强度增加对大豆和小麦生长发育等方面的影响。结果表明, 在自然条件下, UV辐射的增加抑制了被测试作物的光合作用速率及生长;

由于作物蒸腾作用及叶片的气孔传导受抑制, 产量下降。另外, 对UV辐射的增加对农作物的影响作了定量估算, 估算值与实测值的相对误差在0.30-8.56%之间。

关键词: 紫外辐射 大豆 小麦
生长 生物效应

Zheng Youfei and Yang Zhimin. 1996.
Biological response of crops on enhanced solar
ultraviolet radiation and its estimation. Chinese
Journal of Applied Ecology 7(1):107-109.

Studies of the effects of enhanced solar ultraviolet (UV) radiation on the growth and physiology of soybean and wheat show that under natural conditions, the increase of UV radiation can inhibit the net photosynthetic rate and the growth of leaves, stems, and roots of both tested crops. The decrease of biomass and yield is caused by the decline of transpiration and stomatal conductance of leaves. Estimation of the crop response to enhanced UV radiation shows that the mean error between the fitting value and an observed one is 0.30 to 8.56%.

Keywords: ultraviolet radiation, soybean, wheat
growth, biological response



王石立, 赵艳霞, 1996, 气候变暖对
小麦蒸散和产量的可能影响, 中国农业
气象, 17(4):18-22

利用自行研制的水分循环与小麦生长关系的模拟模式, 估算了气候变暖后小麦不同发育阶段农田蒸散量的可能变化及其对产量的影响, 还分析了可能产生的农业投入费用的变

Wang Shili and Zhao Yanxia. 1996. Study of the
possible impact of climate warming on the
evapotranspiration and yield of winter wheat.
Agricultural Meteorology 17(4):18-22.

The possible change of crop evapotranspiration in different development stages of winter wheat and its impact on wheat yield under a warming climate are estimated on the basis of a simulation model. The results show that the transpiration and evapotranspiration after the jointing stage of winter wheat decrease significantly under a

化。结果表明温度升高时小麦生长中后期实际蒸腾量和总蒸散量明显减少, 将导致干物质下降, 产量减少, 产值降低, 并需额外增加灌溉, 从而使农业生产费用增加。

关键词: 气候变暖 冬小麦 蒸散

temperature increase, which would result in the reduction of dry matter and yield and require additional irrigation, so that the cost of agricultural production might be increased.

Keywords: climate warming, winter wheat, evapotranspiration



李秀斌, 1996, 全球环境变化研究的核心领域——土地利用土地覆被变化的国际研究对象, 地理学报, 51(6): 553-558

论述了全球环境变化中的土地利用土地覆被变化的内涵, 在全球环境变化中的作用, 其主要内容、关键问题及研究方法, 并介绍了国外有关研究项目的情况。

关键词: 土地利用 土地覆被
全球环境变化

Li Xiubin. 1996. A review of international research on land use and cover change. *Acta Geographica Sinica* 51(6):553-558.

A general review on the basic concepts, background, and progress on the methodologies of international land use and cover change (LUCC) research is presented. Relevant programs are introduced.

Keywords: land utilization, land cover, global environmental change



李培基, 1996, 青藏高原积雪对全球变暖的响应, 地理学报, 51(3): 260-265

根据60个地面基本气象站1957-1992年逐日雪深观测记录, 用统计模式检验了青藏高原积雪变化趋势。证明近36年来高原积雪变化呈普遍增加趋势, 并且与北半球冬季气温呈正相关。高原积雪的增加与北半球温带低地春季积雪自80年代后期的减少形成了鲜明地对比, 与两个大陆冰盖雪积累率的增加相一致。

关键词: 青藏高原积雪
变化趋势检验 全球变暖

Li Peiji. 1996. Response of Tibetan snow cover to global warming. *Acta Geographica Sinica* 51(3):260-265.

A study of trend testing of Tibetan snow cover variation is presented using daily snow depth records at 60 primary climatic stations covering the period from 1957 to 1992. It is found that the increase of snow depth was almost omnipresent over the Tibetan Plateau, and the fluctuation of snow cover over the Tibetan Plateau revealed a positive relationship with surface air temperature in wintertime over the Northern Hemisphere. This association tends to contrast sharply with the reduced extent of snow cover in extratropical lands in the late 1980s, but coincides with the recent increases in Antarctic and Greenland snow accumulation.

Keywords: Tibetan snow cover, trend testing, global warming

王铮, 张丕远,

周清波, 1996, 历史气候变化对中国社会发展的影响, 地理学报, 51(4): 329-339

讨论了历史时期气候变化与中国人口分布、社会经济、政治疆界的关系, 试图说明全球气候变化对中国可能产生的人文影响。最后讨论了人地关系。

关键词: 全球变化 人文影响 中国

Wang Zheng, Zhang Peiyuan, and Zhou Qingbo. 1996. The impacts of climate on the society of China during historical times. *Acta Geographica Sinica* 51(4):329-339.

The relationship between demography and the social-economy of China with climate change during historical times is discussed, and the human impact of global change on society in China is investigated.

Keywords: global change, impact of human dimension, China



张定琪,

乔宗演, 1996, 冬季气温变化与小麦生产对策, 中国农业气象, 17(3): 10-13

气象资料显示, 建湖县自1980年以来冬季气温变暖, 主要表现在: 冬半年, 小麦越冬前及越冬期间的气温均比1980年前同期偏高, $>0^{\circ}\text{C}$ 积温多 75.1°C , 冬季负积温少 24.6°C 。因此, 小麦生产应采取相应对策, 除了优化产品结构, 减少用种量, 科学肥水运筹之外, 适宜播期应较往年推迟3—4天, 冬性小麦最适宜播期推迟到10月11日—14日, 春性小麦在10月20日—22日, 才能防止冬前、越冬期间旺长拔节, 躲过冬季低温和春霜冻的危害。

关键词: 冬季气温变暖
小麦生产对策

Zhang Dingqi and Qiao Zongyan. 1996. Discussion of temperature variation in winter and countermeasures for wheat production. *Agricultural Meteorology* 17(3):10-13.

Meteorological data show that climate is becoming warmer since 1980 in Jianhu, Fujian. Not only before but also during the period of wheat overwinter, the temperature is higher than that in the same period before 1980, accumulated temperature is 75.1°C higher, and negative accumulated temperature is 24.6°C lower. Therefore corresponding countermeasures should be taken for wheat production. To optimize structure of product, reduce the use of seed, and enhance fertilization and irrigation, the suitable sowing time should be delayed 3 to 4 days.

Keywords: warmer in winter, countermeasures for wheat production

陈丽萍, 韩永翔, 1996, 甘肃省玉米气候产量的周期及其区域分布与降水的关系, 中国沙漠, 16(4): 379-382

为了解甘肃省玉米产量的年际变化及其成因, 本文对全省玉米气候产量进行了功率谱分析, 并研究了其气候产量周期与降水量、干燥度的关系。分析表明甘肃省玉米气候产量主要有6-7a、10a和3a的周期, 其周期分布与5-6月、6-8月降水量的分布, 特别是玉米生育期的干燥度分布有较一致的关系。
关键词: 玉米 产量 功率谱分析 分布规律

Chen Liping and Han Yongxiang. 1996. The period of climatic corn yield and its distribution related to rainfall. Journal of Desert Research 16(4):379-382.

This paper analyzes the climatic corn yield (yw) of each district in the Gansu area by means of power spectrum analysis. The result shows three major periods in the yw series, which are 6-7 years, 10 years, and 3 years. The distribution of these periods coincides with the isohyet figures of May to June and June to August, especially with the pattern of dryness during corn growing period.

Keywords: corn yield, power spectrum analysis, regularity of distribution



Modeling

封国林, 曹鸿兴, 1996, 全球气候长期振动的方程及其求解, 气象学报, 54(6): 753-758

假定行星反照率为温度的平方关系, 导出了零维随机动力气候模式。对相应的Fokker-Planck方程用距阵连分法求解, 得到了10万年、4万年、2万年气候周期的本征值和本征向量。数值计算表明, 在随机噪声强度 $D=1.95$ 时, 10万年气候振动具有最大的振幅, 即Milankovitch理论无法解释的10万年周期。
关键词: 零维气候模式 Fokker-Planck 方程 距阵连分法

Feng Guolin and Cao Hongxing. 1996. Fokker-equation of long-term global climatic fluctuation and its solution. Acta Meteorologica Sinica 54(6):753-758.

Assuming the planetary albedo is equal to a temperature square, a zero-dimensional stochastic-dynamic climate model has been suggested. The appropriate Fokker-Planck equation is solved by use of the matrix continued-fraction method, eigen values, and eigen vectors of 100,000-, 40,000- and 20,000-year climatic periods. When a value of 1.95 is used for the intensity of random noise, the calculations indicate a maximum climatic variability at 100,000 years, which is not explained with the Milankovitch theory.

Keywords: zero-dimensional climate model, Fokker-Planck equation, matrix continued-fraction method

李雪松, A. Berger, 1996,
用数值模拟方法研究第四纪古气候
——以LLN二维模式为例, 第四纪
研究, (4): 289-299

用LLN模式对中晚第四纪大陆冰量
变迁进行了模拟研究。模拟从最初
的末次冰期一间冰期延伸到0.6MaB
P, 模拟的大陆冰量变化与地质记录
对比良好, 二者与地球轨道要素有
关的天文频率上的波动具有很高的
相关性。

关键词: LLN二维气候模式
米兰科维奇理论 大气CO₂含量
大陆冰量 深海氧同位素记录

Li Xuesong and A. Berger. 1996. Simulating
quaternary paleoclimate with the Louvain-la-
Neuve two-dimensional (LLN 2-D) climate
model. Quaternary Sciences (4):289-299.

Studies of the Louvain-la-Neuve two-dimensional
(altitude-latitude) (LLN 2-D) model of the earth's
ice volume change in the late Quaternary are
presented. The first periods are from 0.122 Ma BP
to the present, then from 0.22 Ma BP, the last from
0.575 Ma BP. The major periods of the simulated
ice-volume change correspond to the change in
parameters of the earth's orbit and rotation. Cross-
spectral analysis reveals that the simulated ice
volume highly correlates with the SPECAMP 180
record at frequency bands associated with the
above-mentioned periods.

Keywords: LLN 2-D climate model, Milankovitch
theory, atmospheric CO₂ concentration, earth's ice
volume, deep-sea oxygen isotope record



杨清书, 吴超弱, 1996,
傅氏变换在短序列确定海平面变化
趋势中的应用, 热带地理,
16(2): 107-113

从一元线性回归分析的正则方程出
发, 讨论高频扰动对确定海平面变
化趋势的影响。结果表明, 高频扰动
(周期小于4年)对确定短序列中海平
面变化趋势有显著影响。此外, 还
探讨了用傅氏变换方法来消除高频
扰动的影响, 由低通序列一元线性回
归分析就能从短序列中准确计算海
平面的变化趋势。

关键词: 海平面变化 高频扰动
短序列 傅氏变换

Yang Qingsu and Wu Chaoruo. 1996.
Application of Fourier transform to the
determination of secular trend of relative sea level
from short times series. Tropical Geography
16(2):107-113.

The normal equation of linear regression is used to
assess the effects of high-frequency components
on determination of the secular trend of relative
sea level (RSL). It shows that high-frequency
components (with periods less than 4 years) have
significant effects in determining the secular trend
of the short time series, but that the linear
regression can be still used to forecast the secular
trend of RSL.

Keywords: sea level change, high-frequency
components, short time series, Fourier transform

陈文, 黄荣辉, 1996, 中层大气行星波在臭氧的季节和年际变化中输运作用的数值研究, 大气科学, 20 (5): 513-523

本研究构造了一个34层球坐标原始方程波一流相互耦合模式, 利用此模式从拉格朗日平均环流的观点研究了在常定流下行星波对臭氧的输运作用。研究表明, 行星波对臭氧的输运有明显的季节变化, 在北半球冬季, 由于行星波上传到平流层而大大增强了中高纬地区向极地向下的 O_3 输运; 并且还表明, 热带纬向风的QBO不仅影响东、西风切变而引起热带 O_3 分布的年际变化, 而且通过影响行星波的传播引起了行星波对 O_3 输运的年际变化, 这表现为当热带纬向风处于东风位相时, 中高纬地区行星波对 O_3 的输运比西风位相时强。

关键词: 臭氧 行星波输运
拉格朗日平均环流 年际变化

Chen Wen and Huang Ronghui. 1996. The numerical study of seasonal and interannual variabilities of ozone due to planetary wave transport in the middle atmosphere. Scientia Atmospherica Sinica 20(5):513-523.

A 34-level coupled planetary wave-zonal flow, mechanistic global primitive equation model is constructed, and the effects of planetary wave transport on ozone are studied with the Lagrangian mean circulation forced by planetary waves while the flows are steady. The results show that there is an obvious seasonal variation of ozone as a result of planetary wave transport and the transport is largest during the winter over the Northern Hemisphere. It also shows that the quasi-biennial oscillation (QBO) of tropical winds may cause interannual variation of ozone not only in the tropical regions through the secondary meridional circulation in the westerly or easterly shear zones, but also in the middle and high latitudes areas through planetary wave transport. When tropical winds are easterly, the effects of planetary wave transport on ozone are stronger at the middle and high latitudes than that during the westerly phase.

Keywords: ozone, planetary wave transport, Lagrangian mean circulation, interannual variability



王春乙, 白月明, 温民, 1996, 模拟大气中 CO_2 浓度增加对玉米产量和品质影响的试验研究, 环境科学学报, 16 (3): 331-336

利用OTC-1型开顶式气室, 研究了 CO_2 浓度增加对玉米的影响。结果表明, CO_2 浓度增加, 玉米发育期和株高几乎不受影响, 而生物产量和籽粒产量呈上升趋势; CO_2 浓度增加对玉米籽粒、粗蛋白、粗纤维和总糖含量的影响呈负效应, 对淀粉的影响则成正效应。

关键词: CO_2 浓度 产量 品质

Wang Chunyi, Bai Yueming, and Wen Min. 1996. Effect of CO_2 concentration increase on yield and quality of corn. Acta Scientiae Circumstantiae 16(3):331-336.

The effects of CO_2 concentration increase on corn were studied using open top chamber (OTC-1). The result shows that increases in CO_2 concentration have no effects on corn development stage and height but increase the biomass and grain yield. With CO_2 concentration increased, negative effects on corn seed, rough protein, rough fiber, and contents of total carbohydrate were observed, but the starch of corn was positively effected.

Keywords: CO_2 concentration, yield, quality

薛峰, 曾庆存, 1996, 年际气候变率的数值模拟, 大气科学, 20(5): 524-532

利用IAP GCM 20年的模式输出结果, 计算了模式大气中海平面气压、表面气温和降水的年际变率, 并与相应的观测资料作了对比, 以考察模式对观测年际变率的模拟能力。结果表明模式成功地再现了观测变率地理分布的基本特征, 这说明大气内部动力-物理相互作用过程对年际变率有重要影响, 而模拟值的偏低则显示了模式中未包括的某些外界强迫因子如海温和海冰年际变化的潜在作用。此外, 还讨论了半球平均表面气温的长期演变。

关键词: 年际变率 模拟 观测

Xue Feng and Zeng Qingcun. 1996. A numerical simulation of the climatic interannual variability. *Scientia Atmospherica Sinica* 20(5):524-532.

The simulated interannual variability of sea level pressure, surface air temperature, and precipitation is computed using the 20-year model output of the Institute of Atmospheric Physics (IAP) general circulation model (GCM). The model's ability in simulating variability is shown in that the model successfully reproduces the characteristic features of the geographical distributions of the observed variability. Therefore, the internal dynamical physical interaction processes in the atmosphere have substantial influence on interannual variability. However, the model underestimates the observed variability systematically because of the absence of some external factors, such as the interannual variations of the sea surface temperature and sea ice coverage. Additionally, the long period of change of average surface temperature in the Northern Hemisphere is discussed.

Keywords: interannual variability, simulation, observation



朱永春, 黄士松, 1996, 包含详细水分循环和海冰物理过程的一维气候模式与气候系统内反馈机制的研究, 大气科学, 20(6): 691-702

设计了包含详细水分循环和海冰物理过程的一维气候模式, 着重研究了存在气候内部的反馈机制, 得到如下几点结论: (1) 水汽反馈和冰雪反照率均为很强的正反馈, 但水汽反馈的强度甚于冰雪反照率反馈。(2) 降水过程无论在地表还是在大气中均表现为负反馈。(3) 在大气中, 蒸发过程表现为很强的正反馈; 在地表, 蒸发过程在中低纬度表现为很强的负反馈, 而在高纬度却表现为正反馈。

(4) 大气中的感热输送无论在

Zhu Yongchun and Huang Shishong. 1996. A one-dimensional climate model with hydrological cycle and sea ice physics to analyze feedback mechanisms of the climate system. *Scientia Atmospherica Sinica* 20(6):691-702.

A one-dimensional climate model that includes an explicit hydrological cycle and sea ice physics is devised. The model is used to mainly study the feedback mechanisms in the climate system. Results show that (1) water vapor feedback and ice-albedo feedback are positive with the former stronger than the latter; (2) precipitation is proved to be a negative feedback both at the surface and in the atmosphere; (3) evaporation is a strong positive feedback in the atmosphere and at the surface, whereas evaporation is a strong negative feedback in middle-low latitude and a positive feedback in high latitudes; (4) the atmospheric sensible heat flux represents a negative feedback as it dampens the ice-albedo feedback; (5) the atmospheric latent heat flux proved to be a positive feedback by strengthening greenhouse

大气中还是在地表均表现为较弱的负反馈, 其负反馈作用通过抑制冰雪反照率而表现出来。(5) 大气中的潜热输送无论在大气中还是在地表均表现为正反馈, 其正反馈效应通过放大水汽的温室效应体现出来。(6) 不同反馈的合成是以一种非线性方式, 而不是简单的线性相加。

关键词: 反馈机制 水分循环
海冰物理过程

warming; and (6) different feedbacks interact in a nonlinear way, and the resultant feedback can be much stronger than the additive effect of the individual feedbacks.

Keywords: feedback mechanism, hydrological cycle, sea ice physics



石广玉, 郭建东, 1996, 近百年全球平均气温变化的物理模式研究, 科学通报, 41(18): 1681-1684

用物理模式分析了近百年全球平均气温变化的因子。结果表明: 大气GHGs浓度的增加支配了过去一个多世纪以来的全球增暖, 并很可能将继续支配未来几十年的全球增暖; 平流层火山气溶胶的变化是造成年际和10年间平均地面气温变化的主要原因; 无论是对全球的气温变化趋势, 还是对其10年间和10年际的变化, 太阳活动看来都不大可能具有重要的贡献。

关键词: 全球平均气温 温室气体
自然变化因子

Shi Guangyu and Guo Jiandong. 1996. A physical model for global mean surface air temperature anomalies over the past century. Chinese Science Bulletin 41(18):1681-1684.

A recently developed physically based model and available data are used to examine the important roles that solar variability, greenhouse gases (GHG), and volcanic aerosols play in present climatic variation. The results indicate that (1) GHGs have been dominant over the past century and most likely will continue to dominate global warming in the next decades; (2) stratospheric aerosols could be mainly responsible for the decadal variation of the surface air temperature; and (3) solar variability is unlikely to be a remarkable contributor to global temperature trends which show decadal and interdecadal variations.

Keywords: global-mean temperature, greenhouse gases, sources of natural climate variability

胡桂芳, 张苏平, 1996, 近40年山东省各水资源分区降水变化特征及多步预测时序模型, 气象, 22(8): 16-19

利用近40年山东省41站降水资料, 分析了各水资源分区降水演变特征, 以均生函数为基函数, 用主成分分析进行筛选, 建立了山东省各水资源分区降水时序多步预测模型。通过计算, 试验, 拟合, 预报效果均较好。
关键词: 降水变化特征 水资源分区 多步降水预报

Hu Guifang and Zhang Suping. 1996. The characteristics of rainfall variation in water resource divisions in Shangdong Province in the last 40 years and a multistep time series predictive model. Meteorological Monthly 22(8):16-19.

The characteristics of rainfall variation in the water resource divisions in Shangdong Province are analyzed using precipitation data from 41 weather stations in the last 40 years. Mean generation function is used as the basic function, which is screened through principal component analysis. Multistep predictive models are set up in the water resource divisions in terms of the mean generation function. The forecasting results achieved through testing and fitting are rather good.

Keywords: characteristics of rainfall variation, water resource divisions, multistep precipitation prediction



陈晓光, 徐祥德, 朱乾根, 1996, 河套华北地区旱涝的前期环流异常与大西洋海温的关系及其数值模拟, 气象学报, 54(1): 102-107

首先采用了河套华北地区旱涝的前期异常环流, 然后探讨了这种环流形成的机制, 最后采用了OSU-AGCM作了大西洋地区热源异常强迫的数值实验。结果表明, 大西洋地区海温异常强迫激发的定常波向上、下游的能量传播, 造成的前期秋冬季环流异常与河套华北地区的夏季旱涝有较好的对应关系。

关键词: 河套华北地区 夏季旱涝 大西洋海温异常

Chen Xiaoguang, Xu Xiangde, and Zhu Qiangen. 1996. A numerical experiment on the effect of Atlantic heating and the relationship between the abnormal circulation of the preceding stage on drought and flood in the Hetao Huabei region and Atlantic sea surface temperature anomaly (SSTA). Acta Meteorologica Sinica 54(1):102-107.

In this paper, we analyze the abnormal circulation of the preceding stage on drought and flood in summer over the Hetao Huabei region, present an attempt to explore the forming mechanism of this abnormal circulation, and perform a numerical experiment on the effect of Atlantic heating with the Oregon State University atmospheric general circulation model (OSU-AGCM). The results show that the abnormal circulation of the preceding stage in autumn and winter agree roughly with the drought and flood over the area in summer. The abnormal circulation is formed by the energy propagation upstream and downstream of the stationary waves that are forced by the action of Atlantic SST anomaly.

Keywords: Hetao Huabei region, drought and flood in summer, Atlantic SST anomaly

刘树华, 黄子琛, 刘立超, 1996, 半干旱区植被覆盖度对边界层气候热力影响的数值模拟, 气象学报, 54(3): 303-312

在陆-气相互作用的中小尺度系统研究中, 水平非均匀下垫面的强迫作用是主要的物理过程。本文利用能量闭合二维陆面过程与大气边界层耦合模式, 研究了我国西北半干旱地区 (38°N, 105°E) 夏季下垫面物理特征的变化对区域边界层气候的影响。结果表明: 土壤湿度、植被覆盖度对局地环流和区域边界层气候的形成起着决定性的作用。模拟结果揭示了在半干旱地区大面积植树造林、提高植被覆盖度, 可涵养土壤水分, 改善局地生态环境, 是人工持续改造干旱、半干旱荒漠地区局地气候的重要途径。
关键词: 植被覆盖度 边界层气候 数值模拟

Liu Shuhua, Huang Zichen, and Liu Lichao. 1996. Numerical simulation of the influence of vegetation cover on boundary layer climate in semiarid region. *Acta Meteorologica Sinica* 54(3):303-312.

A two-dimensional mesoscale land-surface process and atmospheric boundary layer coupled model, including a detailed representation of the planetary boundary layer, the soil, and the vegetation, are presented for studying the influence of the variation of vegetation cover on the soil physical properties and boundary layer climate in the semiarid region of northwest China (around 38°N, 105°E). Through heat balance equations the soil surface and vegetation surface were merged in a coupled system in which vegetation was considered as a horizontally uniform layer, soil was divided into 13 layers, and the horizontal differences of vegetation cover were a decisive factor to boundary layer climate. The model can be used to forecast the radiation, heat, and water fluxes in the atmosphere.

Keywords: vegetation cover factor, boundary layer climate, numerical simulation



朱乾根, 兰红平, 沈桐立, 1996, 土壤湿度和地表反射率变化对中国北方气候影响的数值研究, 气象学报, 54(4): 493-500

本文利用OSU两层大气环流模式来考察土壤湿度和地表反射率变化对中国北方气候的影响。在(30-46°N, 90-120°E)的区域上进行了3个实验, 结果表明干土壤对我国东部季风区和西部非季风区有不同的影响特征。高反射率造成降水减少。并指出地表过程的作用可能是经常发生在华北地区春夏连旱现象的重要原因之一。

Zhu Qianggen, Lan Hongping, and Shen Tongli. 1996. Numerical study of the influence of soil moisture and surface albedo on climate of the northern part of China. *Acta Meteorologica Sinica* 54(4):493-500.

Three numerical simulations by the Oregon State University atmospheric general circulation model (OSU AGCM) that integrated more than 50 days are carried out to show the effects of changes in soil moisture and surface albedo on the climate of the northern part of China (30-46°N, 90-120°E). Results of the simulations indicate that dry soil moisture has different effects on the non-monsoonal area in the west of China and the monsoonal area in the east of China. High albedo produces a decrease in rainfall. The article points out that the effect of surface processes is one of the possible major reasons for spring-to-summer

关键词：土壤湿度 地表反射率
华北春夏连旱

continuous drought that happens frequently in the northern part of China.

Keywords: soil moisture, surface albedo, North China, spring-to-summer continuous drought



王晓春, 吴国雄, 1996,
利用空间均匀网格对中国夏季降水
异常区域特性的初步分析, 气象学
报, 54(3): 324-332

Wang Xiaochun and Wu Guoxiong. 1996.
Regional characteristics of summer precipitation
anomalies over China identified in a spatially
uniform network. Acta Meteorologica Sinica
54(3):324-332.

用方差极大正交转动EOF (Varimax EOF) 及点相关图法分析了夏季总降水(6、7、8月降水之和)及逐月降水的区域特性。使用的资料为全国范围47个 $5^{\circ} \times 5^{\circ}$ 经纬度网格上的降水资料, 分析时段为1959—1994年。分析结果表明, 由于采用了空间均匀的格网资料, 本分析除进一步证实了中国东部地区降水异常的区域特性外, 也揭示了西部地区降水异常的区域特性及沿长江流域东西方向上降水异常的相互关系。夏季总降水异常最显著的区域特性是江淮流域与河套及华南反相关。另外沿长江流域, 四川盆地的降水异常与青藏高原东部及江淮流域的降水异常也存在着反相关联系。西部地区的区域特性为青藏高原中东部南北两侧为负相关, 并且青藏高原中东部南侧的降水异常与华北东部及东北南部为正相关。上述的空间模式都有准2—3a及10a左右的周期。逐月降水的分析表明, 6月份, 江淮流域、华北东部及东北大部分地区为正相关。7月, 河套地区与江淮流域的降水异常呈现一定的负相关联系, 8月份降水异常的区域特性与夏季总降水异常的区域特性极其

The regional characteristics of precipitation anomalies of total summer precipitation (total precipitation of June, July, and August) and monthly precipitation are analyzed using the results of Varimax empirical orthogonal function (EOF) and correlation analysis. The data set used is the grid point precipitation over a (5° lat \times 5° lon) network in China in the period of 1959 to 1994. The analysis of total precipitation shows that the most significant regional characteristic is the existence of negative correlation in precipitation anomalies between the low-reaches of the Yangtze River and Huaihe River Valley (LRYH) and the middle-reaches of the Yellow River Valley (MRY region), and between the LRYH region and South China. The precipitation anomaly over the Sichuan Basin is negatively correlated with that over the eastern part of the Qinghai Xizang Plateau and that over the LRYH region. The regional characteristic of summer precipitation anomalies in western China is that there exists a negative correlation between the summer precipitation anomalies over the southern part of the central and eastern Qinghai Xizang Plateau and that over the northern part. There also exists positive correlation between the southern part of eastern Qinghai Xizang Plateau and the eastern part of North China and southern part of Northeast China. The noted spatial correlation models have significant periods of about 3 years and 10 years. The analyses of monthly precipitation show that in June, there exists a positive correlation among the precipitation anomalies over the LRYH region, the eastern part of North China, and Northeast China. In July, the precipitation in the MRV region and the LRYH regions are negatively correlated. The regional characteristic of precipitation anomalies in August

一致。关键词：方差极大正交转动
EOF (Varimax EOF) 分析
夏季降水异常区域特性 夏季降水
逐月降水

is very similar to that of the total summer
precipitation anomalies.

Keywords: Varimax EOF analysis, regional
characteristic of summer precipitation anomalies,
total summer precipitation, monthly precipitation



Radiation and Trace-Gas Emission

卞林根, 陆龙骅, 贾朋群, 1996,
南极中山站紫外辐射的初步研究,
科学通报, 41 (9): 805-807

Bian Linggen, Lu Longhua, and Jia Pengqun.
1996. A preliminary study of the ultraviolet
radiation in Zhongshan Station, Antarctica.
Chinese Science Bulletin 41(9):805-807.

本文分析了1993年2月~1994年12月
南极紫外辐射和总辐射的变化特征
, 初步讨论了南极春季臭氧减少与
紫外辐射和总辐射的关系。南极中
山站紫外辐射与总辐射的比例年平
均为5.7%, 春季(9—11
月)该比例明显高于其它季节。臭
氧与UVB关系是十分显著的, 两者呈
对数关系变化, 同时臭氧的变化对U
V也有一定的影响, 基本上也是呈对
数关系, UV与臭氧的相关系数达到
或超过0.01的信度水平。
关键词: 南极中山站 紫外辐射

The characteristics of the ultraviolet and global
radiation (UV/Q) during the period from February
1993 to December 1994 are analyzed, and the
relationship between the decrease of Antarctic
ozone in spring with the ultraviolet and global
radiation is discussed. The annual mean ratio of
UV/Q in Zhongshan is 5.7%. In spring
(September-November) it is larger than that in
other seasons. The ozone and UVB have a close
relationship basically met by logarithmic line. The
relationship between UV and ozone was almost
similar to that of UVB and ozone and has a
confidence level of less than 0.01. It can be
concluded that the decrease of ozone in spring in
Zhongshan Station not only obviously enhances
UVB but also has effects on UV and global
radiation.

Keywords: Antarctic Zhongshan Station,
ultraviolet radiation



段争虎, 刘新明, 屈建军, 1996,
中国土地沙漠化对大气CO₂含量的影
响, 干旱区资源与环境,
10(2): 89-94

Duan Zhenghu, Liu Xinming, and Qu Jianjun.
1996. Atmospheric CO₂ content affected by
desertification in China. Journal of Arid Land
Resources and Environment 10(2):89-94.

利用沙漠化土地面积、土壤有机碳
的含量及沙漠化的正逆转速率等资

This paper calculates the change of organic carbon
in desertified lands of China using data of areas
and conversion rates (positive and negative) of
desertified lands and contents of organic carbon in

料,分地区分类型统计了我国沙漠化土地中有机碳的变土地沙漠化而释放到大气中的 CO_2 ,总量达173.286Mt,而逆转过程中固定的 CO_2 量为59.124Mt碳,所以,近40年来我国沙漠化土地净释放到大气中的 CO_2 量为124.475Mt碳占全球温带和寒带土地每年释放 CO_2 量133Mt碳的93.5%

关键词:沙漠化 CO_2 大气环境
全球变化

soils. The results show that the organic carbon is 753.143 Mt in 50-cm soil layers, 173.286 Mt of CO_2 are released from desertified lands, and 59.124 Mt of CO_2 have been fixed in the processes to reverse desertification in the last 40 years.

Keywords: desertification, CO_2 , atmospheric environment, global change



郭世昌, 杨秀洪, 邱金桓, 1996,
昆明地面生物有效紫外辐照度的初步计算, 大气科学,
20(4): 414-421

近年来,大气平流层臭氧含量普遍呈下降趋势。这将对人类的生存环境构成极大威胁,应当引起人们的高度重视。其中,太阳紫外辐射是一大因素。太阳紫外光(UVB和UVA,尤其是波长为280-320nm)对动植物生长及人类健康具有重要的生物学效应。但太阳光在大气中的传输过程极其复杂,涉及到大气臭氧吸收、空气分子散射、气溶胶颗粒以及云滴的散射等作用。针对昆明地处低纬高原、季风云系影响显著等特点,本文在同时考虑上述几种情况下,用二流(two-stream model)模式方法对太阳紫外辐射传输问题进行了研究,得出了一些有意义的计算结果,并对其作了讨论。

关键词:UV辐照度
二流近似 臭氧垂直分布

Guo Shichang, Yang Xiuhong, and Qin Jinhuan. 1996. A preliminary calculation on the surface biologically active ultraviolet (UV) irradiance for Kunming by two-stream approximation. *Scientia Atmospherica Sinica* 20(4):414-421.

Recent reports of stratospheric ozone depletion have caused concern about the levels of solar ultraviolet radiation at the earth's surface. A preliminary calculation using a two-stream model of surface biologically active ultraviolet (UV) irradiance (UVB and UVA) in the Kunming area is described in this paper. In the model, the influences of ozone absorption, Rayleigh scattering, cloud droplet scattering, aerosol scattering, and their seasonal variations are considered. Finally, the calculated results including spectral and integral surface irradiances are discussed.

Keywords: UV irradiance, two-stream approximation, O_3 vertical distribution

康惠宁, 1996, 中国森林C汇功能基本估计, 应用生态学报, 7(3): 230-234

根据森林资源波长状况和未来变化趋势, 估计和预测了中国森林固C的现状和潜力。结果表明, 中国森林目前C积累高于C释放, 年平均净固C为 $0.8627 \times 10^8 \text{ t/a}$, 在未来20年内中国森林净固C能力约每年增加 $773 \times 10^4 \text{ t}$, 到2000年, 中国森林固C能力将达到 $1.4697 \times 10^8 \text{ t/a}$ 。
关键词: 森林 CO_2 积累 C汇

Kang Huining. 1996. Estimation of carbon sink function of forests in China. Chinese Journal of Applied Ecology 7(3):230-234.

An estimation of the amount of carbon accumulated by forests are made using the data of changing trends of the forests in China. It shows that the accumulation is higher than the release at the present time, and that the net absorption is about 86.27 million tons per year, which will increase by 7.73 million tons per year in the future 20 years and reach to 146.97 million tons by the year A.D. 2000.

Keywords: forests, carbon accumulation, carbon sink



孔琴心, 刘广仁,

王庚辰, 1996, 1993年春季南极中山站上空大气臭氧的观测分析, 大气科学, 20(4): 393-407

利用球载电化学 O_3 探空仪于1993年南半球春季在南极中山站测量了 O_3 和温度垂直廓线, 三次观测到 O_3 柱总量 $<220 \text{ Du}$ 的低值, O_3 浓度减少从9月开始, 9月中旬-10月中旬达到最大。典型 O_3 垂直廓线表明, O_3 量损失最大区域在高度13-23km之间, 此高度与PSCs和火山气溶胶的存在高度有很好的对应关系。本文给出观测结果及初步分析。
关键词: 臭氧柱总量
臭氧分压垂直廓线 大气温度
南极臭氧洞

Kong Qinxin, Liu Guangren, and Wang Gengchen. 1996. Observations and analyses of atmospheric ozone over the Antarctic Zhongshan Station in the spring of 1993. Scientia Atmospherica Sinica 20(4):393-407.

Using an electrochemical ozonesonde, we measured the vertical profile of ozone and temperature over the Antarctic Zhongshan Station in the spring of 1993. We observed a total ozone less than 220 Dobson units (Du) three times. The reduction of ozone concentration begins in September and reaches a maximum from mid September to mid October. The vertical distribution of the typical ozone indicates that the altitude from 13 to 23 km is the range of the largest ozone losses. This height has a good corresponding relationship with the existing height of the polar stratospheric clouds (PSCs) and volcanic aerosol. The paper presents observation results and fundamental analyses.

Keywords: total ozone, vertical profile of ozone partial pressure, atmospheric temperature, Antarctic ozone hole

吕达仁,

李卫, 1996, 长春地区紫外光谱
(UV-A, UV-B)

辐射观测和初步分析, 大气科学,
20 (3): 343-351

利用自己研制的太阳-

大气紫外光谱辐射计, 从1992年5月
在长春开始实验了野外观测, 监视到
达地表的太阳直射和大气散射紫外光
谱辐射, 主要给出长春地区地面紫外
辐射, 特别是紫外 (UV) B段 (280-
320) 光谱辐射的一些基本特点和初
步统计特征。由于地表UV-B

辐射对生态系统和人类健康有危害作
用, 其强度随着臭氧减少而增加。该
项观测分析将有助于监测和研究臭氧
层变薄的实际效应。

关键词: 紫外光谱辐射

紫外B段辐射 紫外光谱辐射计

刘嘉麒, 钟华, 刘东生, 1996, 渭南黄
土中温室气体组分的初步研究, 科学
通报, 41 (24): 2257-2259

本文对黄土沉积物深部气体组分的含
量与分布作了初步探讨。从CO₂的含
量来看, 渭南黄土与现代土壤相似,
其CO₂含量均较高, 一般为大气CO₂
含量的数倍至数十倍, 而且随着深度
的增大, CO₂气体含量也相应增加。
但渭南黄土中CO₂的碳同位素组成与
现代土壤相差较大, 前者 $\delta^{13}\text{C}$ 值要比
后者重16%以上, 甚至黄土中CO₂
的 $\delta^{13}\text{C}$ 值比当地大气CO₂的 $\delta^{13}\text{C}$ 值都
要重很多, 可以认为, 黄土吸收大气
CO₂是大气CO₂的汇。

Lu Daren and Li Wei. 1996. Observation and
analysis of surface ultraviolet (UV-A, UV-B)
spectral radiances in Changchun. Scientia
Atmospherica Sinica 20(3):343-351.

As one part of global research, surface ultraviolet
(UV) spectral radiance observation began in
Changchun, China, in May 1992, and later in
Beijing. UV spectral radiance was measured with
an absolute-calibrated UV spectroradiometer
developed by the Changchun Institute of Optics
and Fine Mechanics, Chinese Academy of
Science. This paper describes the instrument and
the observation, analyzes the statistics of UV-B
and UV-A radiances, and the ratio spectra of
diffused global radiances as well as ratio spectra
for different solar zenith angles. Observations are
compared with calculations by radiative transfer
models.

Keywords: UV spectral radiance, UV-B radiance,
UV spectroradiometer



Liu Jiaqi, Zhong Hua, and Liu Dongsheng.
1996. Preliminary study of greenhouse gases in
loess in Weinan Shaanxi Province. Chinese
Science Bulletin 41(24):2257-2259.

A preliminary discussion on the concentration and
distribution of greenhouse gases in deeper loess
sediments is made. The carbon dioxide (CO₂)
concentration in loess and modern soil is similar;
that is, CO₂ concentration in loess and modern soil
is higher and generally several times to several ten
times as high as that in the atmosphere.
Furthermore, CO₂ concentration in loess and
modern soil increases with depth. However,
carbon isotope compositions of CO₂ in loess and
modern soil are greatly different. The isotope
 $\delta^{13}\text{C}$ of CO₂ in loess is 16% higher than that in
modern soil and much higher than that in the
atmosphere.

Keywords: CO₂, CH₄, N₂O, loess sediments,
Weinan

关键词: CO₂ CH₄ N₂O
黄土沉积物 渭南



单正军, 蔡道基,
任阵海, 1996, 土壤有机质矿化与
温室气体释放初探, 环境科学学报

16 (2) : 150-154

本文从土壤中有有机质的积累和矿化的角度模拟估算了温室气体在中国土壤中的释放量。结果表明, CO₂从土壤中的释放量为37.5亿t/a, CH₄从稻田中的释放量为0.20亿t/a, N₂O从稻田中的释放量为34.5万t/a。本文提供了一种估算温室气体释放量的简便方法, 并对进一步开展该项研究提出了意见。

关键词: 土壤有机质 矿化
温室气体 释放

Shan Zhenjun, Cai Daoji, and Ren Zhenhai.
1996. A preliminary assessment of CO₂, CH₄, and
N₂O emission from soils in China. Acta Scientiae
Circumstantiae 16(2):150-154.

Greenhouse gas emissions from soils in China were assessed based on the mineralization rate of soil organic matter. It was estimated that 3.75 billion tonnes of CO₂ from soil and 20 million tonnes of methane and 345,000 tonnes of N₂O from paddy soils in China are emitted into the atmosphere every year. The paper provides a simple method for assessing greenhouse gas emissions from soils, and proposes further studies in the next step.

Keywords: soil organic matter, mineralization,
greenhouse gas, emission



汪宏七, 赵高祥, 孙金辉, 1996,
强火山喷发对地面紫外辐射照度的
影响, 环境科学学报, 1

6 (1) : 103-110

本文利用辐射传输理论, 探讨了各种火山气溶胶及O₃变化对到达地面的不同波长紫外直射、漫射和总的辐射照度以及 UV-B 辐射照度的影响。并利用了菲律宾皮纳托博火山喷发前后北京地区O₃资料、激光雷达探测的平流层气溶胶增加的资料进行了模拟计算, 将结果与 UV-B 观测资料作了粗略的比较, 讨论了引起差别的可能原因。

Wang Hongqi, Zhao Gaoxiang, and Sun Jinhui.
1996. Effect of strong volcanic eruption on
ultraviolet irradiancies at the Earth's surface. Acta
Scientiae Circumstantiae 16(1):103-110.

The effects of variations in volcanic aerosols on direct, diffuse, and total ultraviolet spectral irradiancies and UV-B irradiancies arriving at the surface have been simulated with the applied theory of transfer calculations. The simulation results and observed UV-B irradiance change in the northwest suburb of Beijing before and after eruptions of Mt. Pinatubo are compared, and some causes related to the difference between them are discussed.

Keywords: ultraviolet irradiancies, UV-B, volcanic
aerosol, ozone

关键词: 紫外辐射度 UV-B
火山气溶胶 臭氧



杨永辉, P. Ineson, 1996,
草原土壤 N_2O 释放及全球变暖影响下
土壤养分变化的反馈效应, 应用生态
学报, 7(4): 386-390

用实验的方法研究了寒温带草原生态
系统中不同土壤 N_2O 释放规律,
以及全球变暖时土壤有机质分解加速
情景下土壤养分(N、P)浓度升高对 N_2O
释放的影响。结果表明,
以沼泽泥炭土 N_2O 释放量最大,
生长季节为 $1.3 \sim 12.2 \text{ kg N} \cdot \text{hm}^{-2} \cdot \text{a}^{-1}$,
其次为灰壤土, $1.5 \sim 2.4 \text{ kg N} \cdot \text{hm}^{-2} \cdot \text{a}^{-1}$;
酸性棕壤最小, 为 $0 \sim 3.2 \text{ kg N} \cdot \text{hm}^{-2} \cdot \text{a}^{-1}$;
 N_2O 的释放层灰壤土在 $0 \sim 5 \text{ cm}$,
其它2种土壤为 $0 \sim 10 \text{ cm}$ 。施肥试验表
明, N、P肥在生长季节对土壤 N_2O 释
放量影响不显著, 但在生长季末期,
N肥对酸性棕壤及灰壤土 N_2O 影响显
著, 施肥后第3天酸性棕壤由1.3提高
到 $44.2 \text{ kg N} \cdot \text{hm}^{-2} \cdot \text{a}^{-1}$,
灰壤土则由1.9提高到 $31.1 \text{ kg N} \cdot \text{hm}^{-2} \cdot \text{a}^{-1}$ 。

这说明全球变暖对土壤有机质分解的
影响不会诱发 N_2O 释放量的大幅度增
加。

关键词: N_2O 全球变暖 山地草原
施肥

Yang Yonghui and P. Ineson. 1996. N_2O
emission from grassland soils and the feedback
effect of nutrient changes resulting from global
warming. Chinese Journal of Applied Ecology
7(4):386-390.

Nitrous oxide (N_2O) emissions from grassland
soils and the influence of nutrient changes
resulting from global warming are studied. The
study shows that in growing season peaty gley soil
has a maximum N_2O emission that varies from 1.3
to $12.2 \text{ kg nitrogen hm}^{-2} \cdot \text{yr}^{-1}$. This N_2O
emission mainly comes from the top 5 cm in the
micropodzol soil and from the top 10 cm in the
other two soils. Fertilizer application in growing
season doesn't make any difference in different
soils. However, nitrogen application greatly
stimulates the N_2O emission at the end of the
growing season in acid brown earth and
micropodzol soil, and it reached 44.2 from 1.3 kg
nitrogen $\text{hm}^{-2} \cdot \text{yr}^{-1}$ and 31.1 from 1.9 kg nitrogen
 $\text{hm}^{-2} \cdot \text{yr}^{-1}$ respectively. This implies that the
influence of global warming on the decomposition
of organic matters may not play a significant role
in an increase of N_2O emission.

Keywords: N_2O , global warming, mountainous
grassland, fertilizer application

喻本德, 唐孝炎, 李金龙, 1996,
大气中CH₄和N₂O浓度变化对氟氯碳
化合物损耗O₃及ODP的影响, 中国
环境科学, 16 (3): 186-190

在大气中CH₄和N₂O增长的情况下,
采用计数物种法, 对氟氯碳化合物的
分解、氯原子的储库分子的浓度的空
间变化, 及其损耗O₃的量和臭氧消耗
潜势 (ODP) 进行了定量研究。结果
表明, 在0~20km

大气范围内, NO_x增幅最大, 引起这
一区域的O₃有较大的增长, HO_x浓度
有所降低; 在平流层中上层, 由于
CH₄, HO_x

和NO_x的增加, 使得对氯原子条件储
库分子有较大幅度的增加, 氟氯碳化
合物对臭氧的消耗能力因此有所减少
。微量成分对臭氧消耗潜势 (ODP)
值的影响幅度不大, 方向也不确定。

关键词: 臭氧 臭氧消耗潜势
氟氯碳化合物 平流层化学
模式计算

Yu Bende, Tang Xiaoyan, and Li Jinlong. 1996.
A study of the impact of increasing concentrations
of CH₄ and N₂O in the atmosphere on O₃
destruction by halocarbons and ODP. China
Environmental Science 16(3):186-190.

The impact of increasing concentrations of
methane (CH₄) and nitrogen dioxide (N₂O) in the
atmosphere on ozone (O₃) destruction by
halocarbons and ozone depletion potential (ODP)
has been studied with counter species method. In
the atmosphere from 0 to 20 km, O₃ increases
quickly with NO_x rapid growth and HO_x
decrease, and the latter distinctly reduces the
decomposition of HCFC-22. The CFC-11
decomposition is only slightly affected by the
increasing of CH₄ and N₂O. The increasing of
CH₄, HO_x, and N₂O in the upper middle
stratosphere considerably increases the reservoir
molecules of Cl, and thus the ability of O₃
destruction of halocarbons decreases. The impact
of these trace components on ODP is not distinct
according to the paper.

Keywords: ozone, ozone depletion potential,
halocarbons, stratosphere chemistry, model
calculation



郑循华, 王明星, 1996,
稻麦轮作生态系统中土壤湿度对N₂O
产生与排放的影响, 应用生态学报,
7(3): 273-279

通过对太湖地区稻麦轮作生态系统的
N₂O排放及土壤湿度进行系统观测和
模拟实验, 研究了降雨和土壤湿度对
N₂O排放和产生过程的影响。结果表
明, 春季和秋季麦田N₂O排放与降雨
量呈明显正相关, 但水稻田和冬季麦
田的N₂O排放不受降雨影响。稻麦轮
作周期内的N₂O排放较强烈地受土壤
湿度制约, 土壤

Zheng Xunhua and Wang Mingxing. 1996.
Impact of soil moisture on N₂O production
and emission from a rice-wheat rotation
ecosystem. Chinese Journal of Applied
Ecology 7(3):273-279.

The impact of precipitation and soil moisture
on N₂O production and emission is studied on
the basis of in situ measurement of soil
humidity and N₂O emission from a rice-
wheat rotation ecosystem and on a simulated
experiment in the laboratory. The results
show that the N₂O emission from the wheat
field is positively correlated with precipi-
tation in spring and autumn but not in
winter, and that N₂O emission from a rice
field is not influenced by precipitation.
Within the rice-wheat rotation, N₂O emis-
sion is intensively affected by soil moisture.
A 97 to 100% of soil water-holding capacity
(i.e., 84 to 86

湿度为田间持水量的97-100% 或84-86% WFPS (土壤体积含水量与总孔隙度的百分比)时, N_2O 排放最强, 低于此湿度范围时, N_2O 排放通量与土壤湿度呈正相关, 反之, 则呈负相关。田间 N_2O 排放随土壤湿度的变化形式与模拟条件下培养土壤样品的 N_2O 产生率变化非常相似, 但前者的最佳湿度范围比后者窄, 而且偏小。
 关键词: N_2O 排放通量 土壤湿度 降雨量 N_2O 产生率

张厚暄, 李玉娥, 1996, 减缓农业生产中温室气体排放的对策及其经济可行性初探, 中国农业气象, 17(5): 7-11

分别探讨了减缓农业生产中 CO_2 和 CH_4 排放的各种可能途径。减少 CO_2 排放的途径: 改进土地利用格局, 减少农业系统碳分离, 增加生物燃料生产等。减少 CH_4 排放的主要途径: 提高饲料质量, 开发沼气生产, 加强稻田水肥管理等。最后还初步讨论了实施这些减排措施的经济可行性问题。

关键词: 农业生产 温室气体排放 经济可行性

of water-filled pore space) leads to a maximum N_2O emission. When the soil moisture is lower than this range, there is a positive correlation between N_2O emission flux and soil humidity, and vice versa. The variation pattern of N_2O emission with soil moisture from simulation is similar in that from investigation of fields, although the optimum moisture range for N_2O emission in the fields is lower.

Keywords: N_2O emission flux, soil humidity, precipitation, N_2O production rate



Zhang Houxuan and Li Yu'e. 1996. Strategies for retarding greenhouse gas discharge from agriculture production and their economic feasibility. Agricultural Meteorology 17(5):7-11.

Strategies for retarding carbon dioxide (CO_2) and methane (CH_4) emissions in agricultural production are discussed. The ways to reduce CO_2 emissions are to improve land use, reduce carbon decomposition in the agrosystem, and increase production of biological fuel. The ways to reduce CH_4 emissions are to improve the quality of forage, utilize methane, and enhance the management of fertilizing in rice fields. Finally, the economic feasibility of these strategies is discussed.

Keywords: agricultural production, greenhouse gas emission, economic feasibility